FACTORY

BETTER PRODUCTION AND MAINTENANCE THROUGH BETTER MANAGEMENT

JANUARY 1959

PRICE ONE DOLLAR

A McGRAW-HILL PUBLICATION

MANAGED MODERNIZATION . . . p. 41

At work today in 16 plants—7 articles, 19 pages

HOW TO IMPROVE YOUR PLANT LAYOUT . . . . . p. 212

MAINTENANCE SHOW GUIDE—64 BONUS PAGES . . . . . p. 121

Fairly commonplace in industry today are special hazard areas, where special protection must be provided to assure against possible serious loss by fire. Grinnell, with 88 years' experience protecting against fire hazards of every description, has the most effective extinguishing agents and best systems for each type of hazard.

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Write for your complimentary copy today. Grinnell Company, Inc., 277 West Exchange St., Providence, R. I.

TABLE OF CONTENTS

- Recognizing Your Special Hazards
- The Fire Triangle in Special Hazard Fire Protection
- Special Hazard Fire Terms Defined
- Water Spray Systems
- Selfcon Water Spray Systems
- Foam Systems
- Carbon Dioxide Systems
- Dry Chemical Systems
- Control Equipment and Devices
- Quick Selector Chart
- Research and Testing
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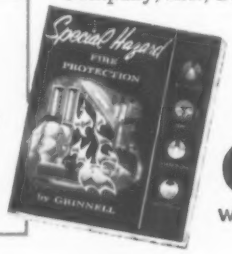

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SUCCESS STORIES

B.F.Goodrich distributors helped these customers cut costs. Can they help you?

Bang, rattle, shake

At a Kansas zinc plant, expensive metal pipes were cracking up after a few months' service. They carry hot acid at 400 gallons a minute. But vibrations from the powerful pump shook the pipes until they banged and rattled, gradually cracked, leaked corrosive acid.

The plant superintendent, working with a B.F.Goodrich distributor, decided to replace a short length of lead pipe between the tank and pump with a B.F.Goodrich Flexseal Connector. This is a special kind of hose, made of thick, resilient rubber, which is designed to absorb the pump vibrations traveling along pipelines.

At a cost of only $105, this B.F. Goodrich hose saved the company $1,000 in the first year by eliminating the harmful shaking that caused broken connections, frequent repairs, costly pipe replacements. Even greater savings will be made because the sturdy, acid-resisting hose is expected to last another two years.

That's oil, brother

A manufacturer of building materials was looking for a longer-lasting conveyor belt to carry hot, oily pieces of grit. The type of belt previously used had to be replaced every four to six weeks. About two years ago, a B.F. Goodrich distributor sold them a "Superoilproof" conveyor belt. It's still in service, looks good for at least two years more.

Stock situation

A glass company needed supports for a mixer weighing 26,000 pounds. B.F. Goodrich Vibropads, rubber pads for use under machinery, could have been specified, but the customer couldn't wait for shipment from Akron. The B.F.Goodrich salesman working with his distributor stuck his neck out and recommended B.F.Goodrich "Armorite" sheet rubber, usually used for chute linings, conveyor skirt boarding and other places where extra toughness in rubber is needed. The distributor had the Armorite in stock; it was cut, mounted like Vibropads, and the problem was solved.

On the paper route

Pulp-and-paper companies in the far west needed belts only 2½ inches wide to hold stacks of dry pulp and paper on large cutting machines. Each machine needs 30 to 47 belts, usually about 24 feet long. A B.F.Goodrich distributor in Hoquiam, Washington, solved the problem by cutting a 30-inch sheeting belt to the narrow widths, then spliced the belts to make them endless.

Keeping posted

A purchasing agent for a west coast steel company, answering a letter from a B.F.Goodrich distributor about new B.F.Goodrich products, said, "Your letter . . . is an excellent way to call our attention to new developments . . . As you undoubtedly know, the value-analysis program . . . requires that we conduct a continuous search for new and better products which can perform their function better for equal or less cost. This does not mean, however, that the initial cost will always be lower."

If you would like to know about these new products, ask your B.F.Goodrich distributor, or write to the address given below.

Hose sorry now?

A paper-box manufacturer, in West Virginia, returned a piece of steam hose to his distributor with the complaint that it had lasted only 5 weeks on battery molding presses. He said other B.F.Goodrich hose had lasted 50 months in similar service and was still in use. B.F.Goodrich men were mystified until technical men examined the returned hose and found that it had not been made by B.F.Goodrich at all. Customer explained that a workman must have misidentified a piece of competitive hose, and told distributor that BFG "Burstproof hose" would be used in the future.

New products

Acid hose. New "Commander" acid hose, developed by B.F.Goodrich, handles highly corrosive acids and chemicals that eat holes in ordinary rubber hose. New rubber compound provides high resistance to strong oxidizing acids, such as concentrated sulphuric acid, nitric acid and chromic acid. Sizes from ¾″ to 20″.

Rubber buckets. B.F.Goodrich rubber buckets are now being made with stainless steel handles, locked into the buckets with stainless steel clips. Handles can't pull off.

New handbook

V belt maintenance. 12-page illustrated manual, "How to get longer life from V belt drives" tells how V belts work, how to select V belts that fit, how to install them, how to keep them running, and how to spot trouble.

For more information

For full information about any product on this page, see your B.F.Goodrich distributor or write *B.F.Goodrich Industrial Products Co., Dept. M-492, Akron 18, Ohio.*

B.F.Goodrich
industrial rubber products

How to make a noisemaker pipe down—see "Bang, rattle, shake"

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CONTENTS JANUARY 1959

Cover—Original watercolor (by Kent Day Coes) of Rockwell Manufacturing Company's eye-catching plant at Porterville, Calif.

Letters 8

Press Time Report ..... *after* 34
Looking Ahead in Business, Ideas of the Month, Maintenance Cost Index, Looking Ahead in Labor

Managed Modernization at Work 41

Making Managed Modernization Work 42

Master-Planning Modernization 47

Marketing: Best Pacesetter for Modernizing 50

When Product Changes Call for New Processes 52

Five Ways to Modernize Your Plant 54

*Seven Tips on Modernizing Management (FC-22) ... 57

*Preventive Maintenance Plan Fits Anywhere (FC-23) . 60

Six Key Workforce Problems in '59 67

Better Ideas—Better Methods 68

CASE BOOK for Plant Operating Management 71
16 idea-packed pages—see contents, page 72

Ideas of the Month 88

Equipment News 90

Guide to Plant Engineering and Maintenance Show ... 121

Honest-John Handling Incentive 192

Labor Relations News 200

Human Relations 208

*How to Spot Your Plant Layout Problems (FC-24) ... 212

Catalog News 220

Books 230

Films 234

Materials News 238

Advertisers' Literature 242

*For your free file copy of this article, circle appropriate number (parentheses above) on Reader Service Card, next to back cover.

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Edited exclusively for the men with management responsibilty for production and maintenance in the manufacturing industries

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THIS SIMPLE FILING SYSTEM is designed to give quick access to past FACTORY articles that can help you solve current operating problems. Here's how it works:

1. All major articles and many short items are classified according to a functional code system (below). Codes cover basic operating responsibilities.

2. Where applicable, articles are also coded (see numbers in parentheses) to show secondary or closely related topics.

3. To use, cut up the items below. Paste them on 3x5-in. cards and file by code number. To cross-index, copy the information on a second card, and file by secondary code.

Note: For suggestions on using this new tool (plus an outline for a more complete decimal filing system), see FACTORY, February 1957, page 104.

BASIC INDEXING CODE

1.0 Plant Engineering	2.0 Production	3.0 Plant Management
1.1 Management and Practices	2.1 Management	3.1 Organization and Policies
1.2 Buildings and Yards	2.2 Production Controls and Systems	3.2 Personnel Development
1.3 Services and Facilities	2.3 Methods and Technology	3.3 Employee Relations
1.4 Electrical Services	2.4 Materials Handling and Plant Layout	3.4 Labor Costs

1.1 Preventive Maintenance Plan Fits Anywhere
Jan. '59, p. 60

1.1 Machine Shop Rolls Where It's Needed
Jan. '59, p. 78

1.2 Master-Planning Modernization
Jan. '59, p. 47

1.2 When Product Changes Call for New Processes
Jan. '59, p. 52 (2.4)

1.2 Screens Cut Cooling Costs $22,000
Jan. '59, p. 79

1.2 This Foundation Is Built on Sand
Jan. '59, p. 80

1.2 No Cold Draft Here!
Jan. '59, p. 82

1.2 Best Sniffer Yet for Fire, Smoke, Gas
Jan. '59, p. 84

1.2 Oven Takes to Roof (2.3)
Jan. '59, p. 86

1.2 Scholastic Sleuth (3.2)
Jan. '59, p. 209

1.3 Repair Bills Trimmed
Jan. '59, p. 79

1.3 Measures Effect of Pipe Corrosion
Jan. '59, p. 81

1.3 Saves $200 a Month in Coolant Costs
Jan. '59, p. 83

1.4 Three Trucks Slip Honing Machine in Place (2.3)
Jan. '59, p. 74

2.2 New Network Saves Thousands
Jan. '59, p. 73

2.2 Red Arrow Calls Inspector
Jan. '59, p. 78

2.2 Tells Where Jobs Are at a Glance
Jan. '59, p. 83

2.3 Better Ideas—Better Methods
Jan. '59, p. 68

2.3 Ribbon of Light Marks the Path
Jan. '59, p. 73

2.3 Four At-a-Time Welding
Jan. '59, p. 75

2.3 Tape Holds Parts Down Flat
Jan. '59, p. 75

2.3 Tilt Makes Machining Easy (2.4)
Jan. '59, p. 79

2.3 Non-Skid Potion Cuts Breakage (2.4)
Jan. '59, p. 80

2.3 Ultrasonics Dusting
Jan. '59, p. 82

2.3 These Cost-Cutters Are Prize-Winners
Jan. '59, p. 82

2.3 Huge Riveter Speeds Assembly
Jan. '59, p. 84

2.3 Photocopier Goes Where It's Needed
Jan. '59, p. 84

2.3 Four Smart Ideas Chop Plant Costs
Jan. '59, p. 85

2.3 Two-Action Tool Cuts Handling
Jan. '59, p. 86

2.4 Numerical Controls Pay Off Faster
Jan. '59, p. 74

2.4 Handles Big Steel Members Easier (2.3)
Jan. '59, p. 75

2.4 Better Handling Pays Off
Jan. '59, p. 76

2.4 Simplifies Heavy Roll Handling
Jan. '59, p. 76

2.4 How to Do a Sweet Handling Job (2.3)
Jan. '59, p. 77

2.4 How to Spot Plant Layout Problems
Jan. '59, p. 212

3.1 Managed Modernization at Work
Jan. '59, p. 41

3.1 Making Managed Modernization Work
Jan. '59, p. 42

3.1 Marketing: Pacesetter for Modernizing (3.3, 2.2)
Jan. '59, p. 50

3.1 Five Ways to Modernize Your Plant (1.4, 1.2)
Jan. '59, p. 54

3.1 Seven Tips on Updating Management
Jan. '59, p. 57

3.1 Bad-Times Editorial
Jan. '59, p. 74

3.1 Newest Slant on Scholarships
Jan. '59, p. 84

3.2 Six Key Workforce Problems in '59 (3.3)
Jan. '59, p. 67

3.2 Rate Yourself as a Manager
Jan. '59, p. 78

3.2 Helping Salaried People Move Up
Jan. '59, p. 79

3.2 "Sit Down" Legman
Jan. '59, p. 82

3.2 Grass Roots Problem Approach (3.3)
Jan. '59, p. 86

3.2 Cure for Poor Work—Save the Sweet Talk
Jan. '59, p. 208

3.2 Seeking Older Workers
Jan. '59, p. 209

3.3 Contest Boosts Plant Safety Record
Jan. '59, p. 72

3.3 Flashing the News Day by Day
Jan. '59, p. 76

3.3 Prevents Rail Sliding Accidents
Jan. '59, p. 84

3.3 Cure for Absence—Spread Responsibility
Jan. '59, p. 208

3.3 Plain Talk—Japanese Style
Jan. '59, p. 208

3.3 Big Money for Suggesters
Jan. '59, p. 208

3.3 Automated Aladdin
Jan. '59, p. 209

3.3 Regimented Thinkers
Jan. '59, p. 209

3.4 College Boys Win, Company Loses
Jan. '59, p. 75

3.4 Honest-John Handling Incentive (2.4)
Jan. '59, p. 192

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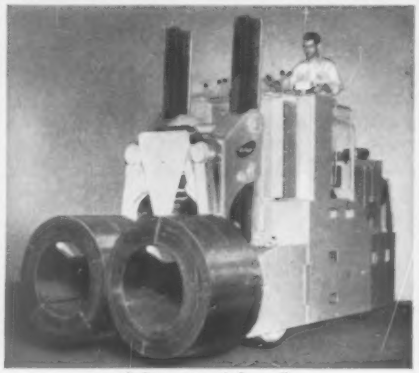
Paper roll clamp truck.



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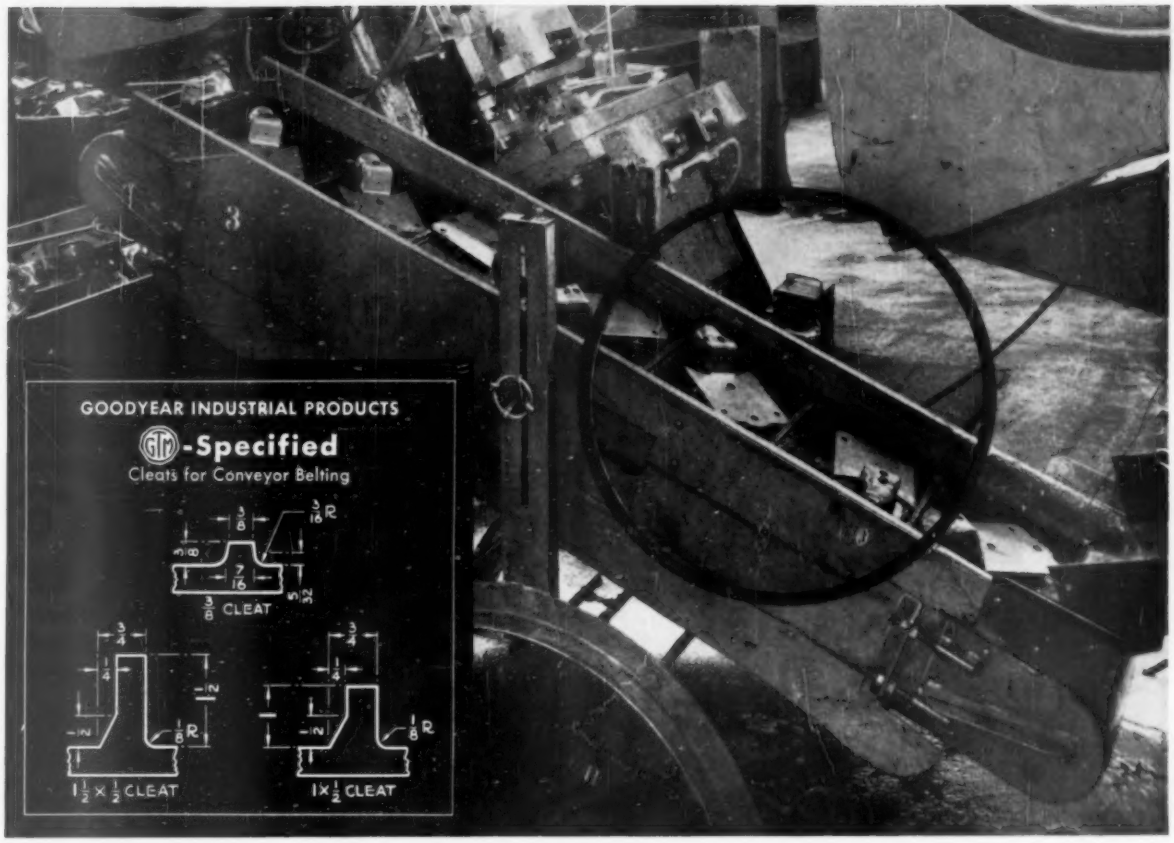

They're raising production—and lowering costs by ⅓

Portable conveyors—between production lines on different levels—were a "must" at this Midwestern automotive parts plant. But the specially constructed belts they used soon cut and flaked off. They became oil-soaked and accumulated dust—dirtying the parts. Worse still, they stretched—had to be taken up every 6 weeks. Even then, none lasted more than a year.

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Like to have savings like these on your production lines? The fastest way to find out is to call the G.T.M. He'll be Johnny-on-the-spot if you contact your Goodyear Distributor – or write Goodyear, Industrial Products Division, Akron 16, Ohio.

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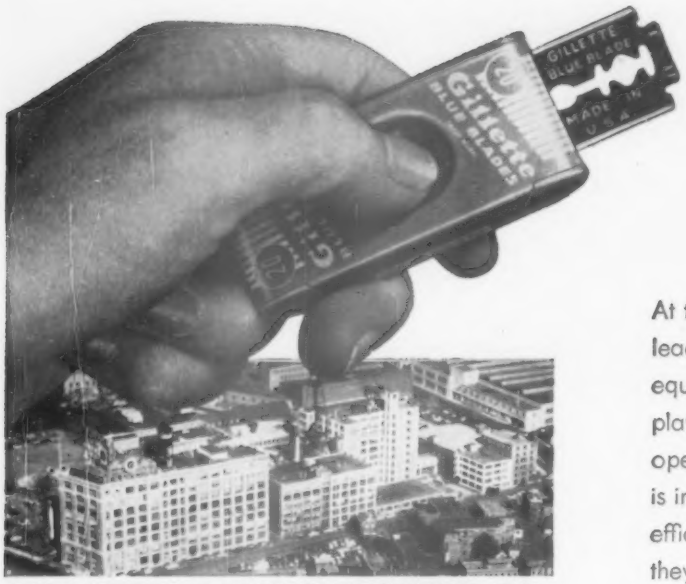

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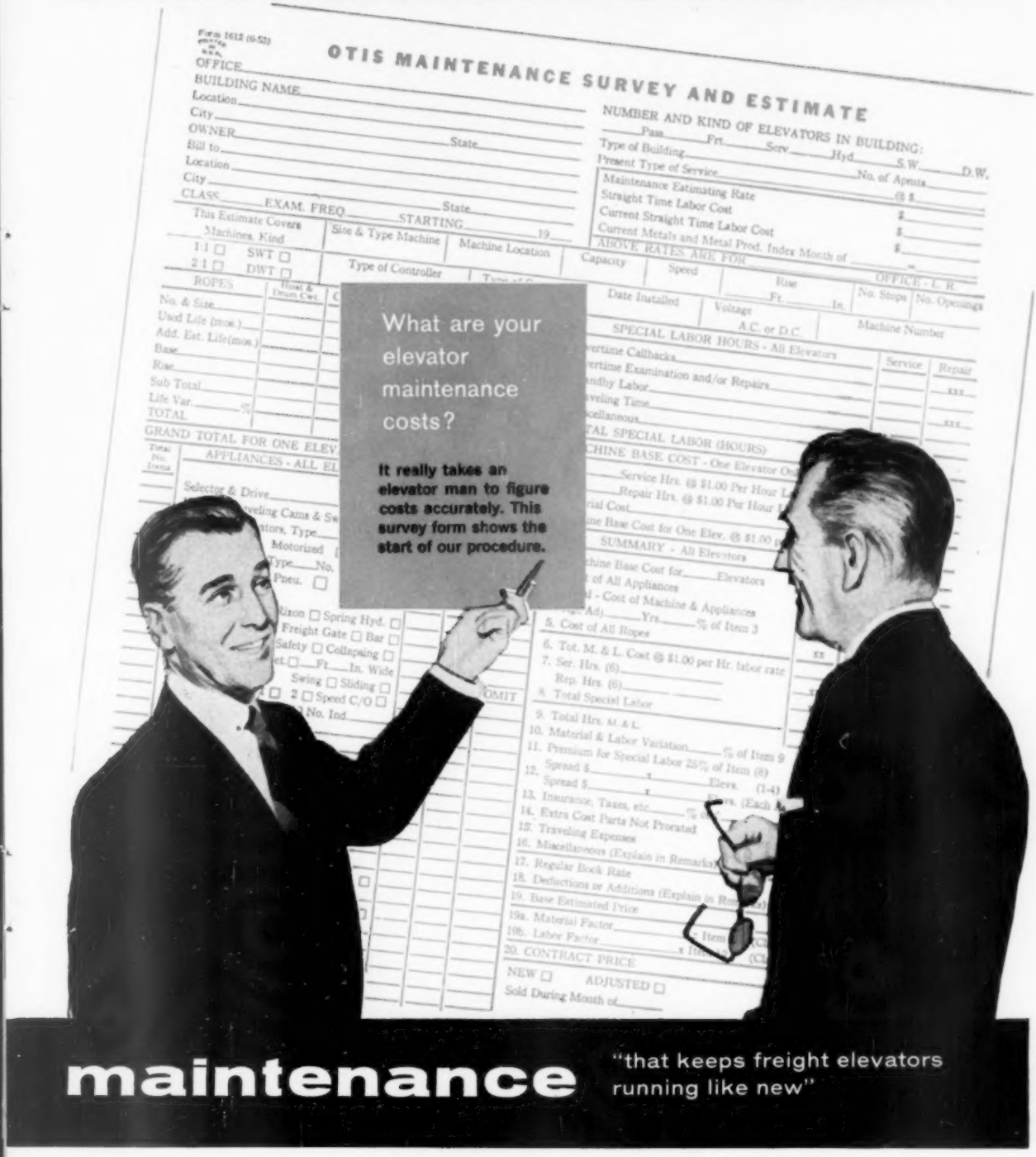
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George M. Wagner
Plant Engineer
Downingtown Paper Co.
Downingtown, Pa.

Sir:

The reports on your survey of Plant Maintenance and Engineering Practices more than compensated for the effort involved in completing your questionnaire. There is a wealth of information here, and I am sure that by conscientious application we can improve our operation.

I want particularly to compliment you on your judgment in separating research and development laboratory operations such as ours from the remainder of the plants. . . Thanks for the excellent reports.

C. J. Fuccella
M. A. & R. Plant Engineer
Procter & Gamble Co.
Cincinnati 17

Turn the page

FACTORY
January 1959 Vol. 117, No. 1

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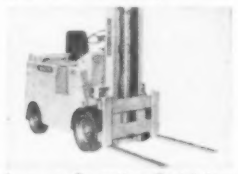

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Name_____ Title_____

Company_____

Address_____

Mail to **TOWMOTOR CORPORATION**, Cleveland 10, Ohio

Tough Tape

for HEAVY-DUTY PACKAGING!

PRESSURE-SENSITIVE SHUFORD'S SHURTAPE® RP-25 MEETS FEDERAL SPECIFICATION PPP-T-76*

**Tape, Pressure-Sensitive, Adhesive, Paper, Water Resistant.*

Cartons full of heavy parts or assemblies stay together when they're sealed with rope-paper backed Shuford's SHURTAPE RP-25.

Use it to seal V-Board and W-Board fibre containers . . . use it on individual parts to protect surfaces . . . or for banding and bundling.

Heavy duty SHURTAPE RP-25 features heavy adhesion and has excellent resistance to water and abrasion. Serves many industrial purposes!

For information on Shuford's complete line of pressure-sensitive paper tapes, write

CLOTHES LINES • TWINES
PRESSURE-SENSITIVE PAPER TAPES
SASH CORDS • WEATHER STRIPPING
COTTON & RAYON YARNS • EXTRUDED PLASTICS

Shuford Mills, INC. SINCE 1880 HICKORY, N. C.

World's largest manufacturer of cotton cordage

2757

For more facts Circle 455 on Reader Service Card

FACTORY / LETTERS

Begins on page 8

► Reprints of the two sections of the report (Electrical Management—Aug. 1958; and Maintenance Management—Sept. 1958) are available at 50¢ each. The special report on research and development laboratories is $1. For those who want the complete tabulation of survey data (more than 200 pages), we still have some photo-process reproductions at $5.25. Write: Reader Service Dept., FACTORY, 330 West 42nd St., New York 36.—ED.

TOOL INVENTORY

Sir:

We have currently concluded a study of our machine tools to determine the percentage of machines which fall into various age groups. We are wondering how we compare with other organizations or with a national average in this respect.

If you have any statistics or know of any studies made in this regard, we would greatly appreciate your help in obtaining these data.

Max Gottesman
Industrial Engineer
Bendix Aviation Corp.
No. Hollywood, Calif.

► Every five years, our sister publication, American Machinist, makes a nation-wide "inventory of machine tools." The 8th and latest of these monumental studies was published in its Nov. 17, 1958, issue. Virtually every machine tool in the United States is identified by type, industry, location, and age. Reprints of this study are available at $2. Write: Reader Service Dept., American Machinist, 330 West 42nd St., New York 36.—ED.

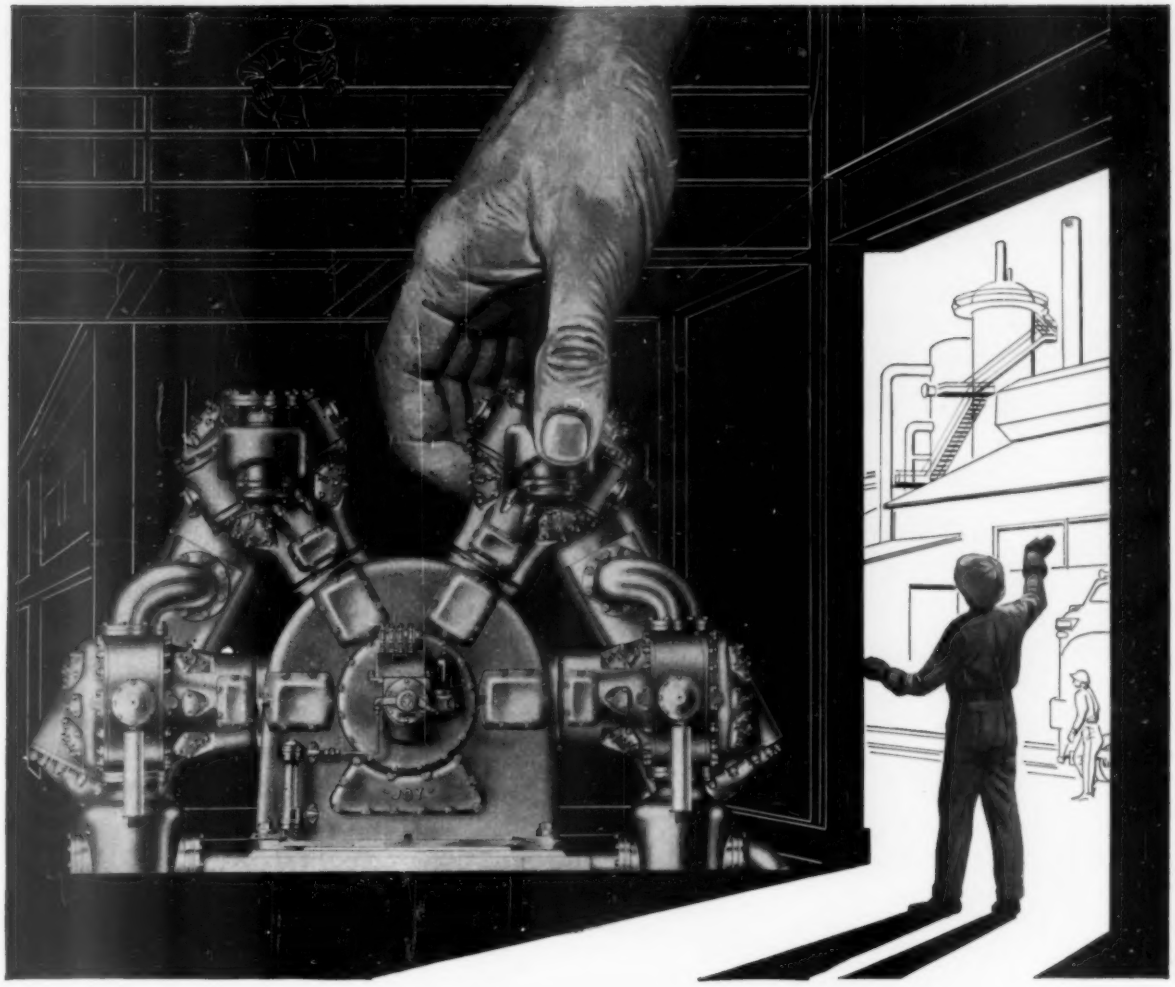
PRECEDENT OR NO?

Sir:

Your monthly feature, "You Be the Arbitrator," always carries a "caution" (in the area devoted to the award), which states:

"Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved."

The editorial article entitled "Creeping Legalism in Labor Arbi-



SET A 500 TO 1000 HP AIR COMPRESSOR IN THE CORNER OF YOUR PLANT . . . *almost as easy as this*

IF YOUR EXPANDING PLANT FACILITIES are requiring more compressed air . . . *and* putting a squeeze on plant space, here's the answer . . . the *new* Joy WN-224 compressor. Because of its compact semi-radial design, the WN-224 is delivered as a package—completely assembled—ready to go. Just bolt it down, connect power, water, and air lines . . . and you're ready for long, continuous service. This is the only true "package" compressor available in these capacities . . . 2418 to 6048 cfm . . . horsepower ratings from 350 to 1000.

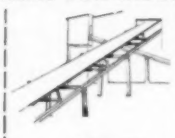
AND THE WN-224 SOLVES YOUR SPACE PROBLEMS . . . it can be installed where no other compressor of equal capacity will fit. Instead of long, horizontal units on massive foundations, the Joy WN-224 has four cylinders arranged semi-radially around the frame. This compact, balanced arrangement assures smoother running, gives longer service with far less maintenance. Get the whole story on the WN-224 from ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

WSW 1 6566-179

Write for FREE Bulletin 179-12

JOY . . . EQUIPMENT FOR INDUSTRIAL PLANTS . . . FOR ALL INDUSTRY

Industrial Compressors


Conveyors

Electrical Connectors

Fans and Blowers

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when you pack "knock-downs" for

HOME ASSEMBLY

Compact, convenient paper bags make excellent security agents for packaged home-assembly products. They speed packing, help lower shipping and handling costs, conserve valuable warehouse and shelf space.

Take the toy wagon bag, above. It packs 22 put-'em-together metal parts. Bag replaces carton, is lighter, less expensive. Colorful printing serves as economical advertising for brand name and contents.

Write for free Booklet CP-1 today. It illustrates dozens of different ways paper bags are helping manufacturers save money, both inside the plant and out.

union camp

Commercial Packaging

UNION BAG-CAMP PAPER CORPORATION

233 BROADWAY, NEW YORK 7, N. Y.

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tration" (Vol. 13, No. 3, of the *Arbitration Journal*) would tend to completely refute the "caution" paragraph mentioned above. . .

Arbitrators, being no less human than judges . . . quite naturally are turning to previous decisions in an effort to get everybody involved "off the proverbial hook."

S. S. Greenberg
Niagara Apparel Co., Inc.
Buffalo, N. Y.

► Mr. Greenberg has a point, and a good one. We discussed it with the American Arbitration Association (which provides the material for our feature, and also suggested the wording of the "caution"). Conclusion: We agree that arbitrators often follow precedent, but we have some reservations on the extent of the practice; certainly it is not universal. For our interpretation of the *Arbitration Journal* editorial referred to by Mr. Greenberg, see "Not Wanted: Jargon," page 173, FACTORY, Dec. 1958.—ED.

MAINTENANCE RATIOS

Sir:

Have you ever published statistical data on repair and maintenance costs of industrial buildings? I would like to get an idea of the ratio of annual maintenance and repair costs to total cost of brick, concrete, and steel building. . .

We do keep separate building M&R costs . . . but as our buildings were constructed at various times over a 50-year period, at widely varying price levels, it is questionable whether a M&R to building cost ratio would be meaningful. . .

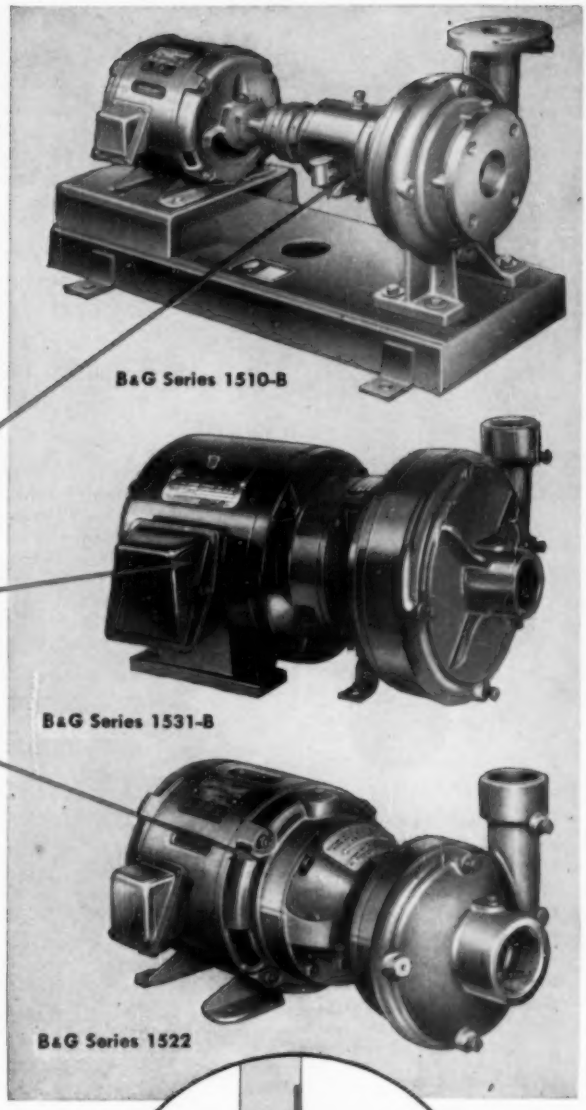
If such data are available, I would appreciate receiving them.

Joseph B. Cibulka
Controller, The Falk Corp.
Milwaukee

► We've never seen exactly the data requested. And because of differences in accounting practice as well as the age-and-condition consideration mentioned by Mr. Cibulka, use of such statistics as a basis for budgets or goals would be dangerous, even foolhardy.

A close approach to the above

WHEN YOU NEED A *GOOD* PUMP IN A *BIG* HURRY...



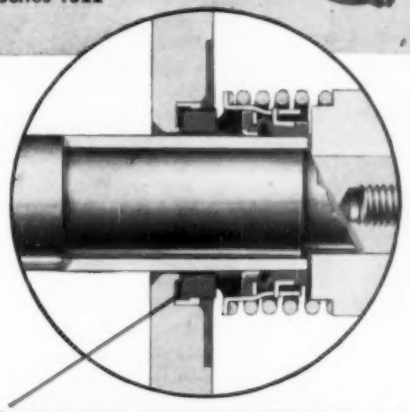
ORDER A B&G STOCK PUMP!

B&G maintains a factory stock of the most commonly used sizes of centrifugal pumps for immediate delivery. Base mounted and integral-motor pumps as listed in B&G Stock Pump Catalog are available in capacities to 325 GPM, heads to 140 ft.

Why B&G Centrifugal Pumps give years of trouble-free service is evident from their design features. Vertical split case construction permits removal of the bearing bracket without disconnecting pipe lines or motor leads. Special alloy steel shafts are super-finished and over-sized to keep deflection at a minimum.

Leak-proof operation is assured by the "Remite" Mechanical Seal—an exclusive B&G development. "Remite" is so hard it will cut glass—eliminates packing rings and gland adjustment. Seal is self-lubricating.

Send the coupon for catalog



LEAK-PROOF "REMITE" MECHANICAL SEAL

BELL & GOSSETT COMPANY
Dept. FO-13 Morton Grove, Illinois
Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

BELL & GOSSETT CO., Dept. FO-13, Morton Grove, Ill.
Please send a copy of the B&G Stock Pump Catalog CSP-257A.

Name.....

Address.....

City.....*Zone*....*State*.....

NEW Snap-on MAGNETIC SOCKETS last ten times longer — give re-usable magnet bonus

Cutaway view showing socket, magnet, self-tapping screw. *Snap-on* magnetic sockets are available in the following sizes: ¼-in. drive for ¼, 5/16, 3/8-in. sockets; 3/8-in. drive for 5/16, 3/8, 7/16, ½-in. sockets; ½-in. drive for 7/16, ½-in. sockets.

On actual customer test, this newly developed socket drove 112,320 self-tapping screws. A similar competitive socket, priced only about 30 cents less, wore out after driving only 10,530 screws. Both sockets were subjected to identical conditions.

Figure what *you* can save by switching to these new *Snap-on* sockets — in replacement cost — and in assembly line downtime, too.

and here's an Extra Bonus . . . re-use your magnets — save up to 50%

In addition to far greater life, this socket is available without the magnet. You simply tap or press the magnet out of the worn-out socket — insert it in the new one. You save 50 percent on the cost of a complete magnet socket. *Snap-on* has developed an inexpensive tool that inserts the magnet to exactly the right depth.

This is an example of *Snap-on* research and development that helps industry save time and money. Your *Snap-on* industrial tool specialist can show you many more. Branch offices and warehouses are conveniently located in 58 major cities throughout the U.S. and Canada.

To remove magnet, simply tap it out of the socket with an appropriate punch.

To re-insert, just tap magnet into socket with *Snap-on* assembly punch. The entire operation takes about a minute.

SNAP-ON TOOLS CORPORATION

8044-A 28th Avenue • Kenosha, Wisconsin

ratios will be published in February FACTORY. We'll have ratios of *total* maintenance and repair cost to net sales, cost of goods sold, gross property, and net property. Data from 680 companies are now being processed by Remington Rand on its Univac computer.—ED.

WHO'S DOING PM?

Sir:

In your Sept. 1955 article on "Preventive Maintenance" by Carl G. Wyder, he mentioned that information from other plants could be helpful in selling and setting up a PM program . . . I would be especially interested in plants that have PM programs on heat-treat furnaces.

Dean A. Mulgren
Metallurgical Department
Chevrolet-Saginaw Transmission
Saginaw, Mich.

► On specific types of equipment, best chance is probably to check with the equipment manufacturer. He can generally suggest specific PM procedures as well as refer you to other users of his equipment who have PM programs.—ED.

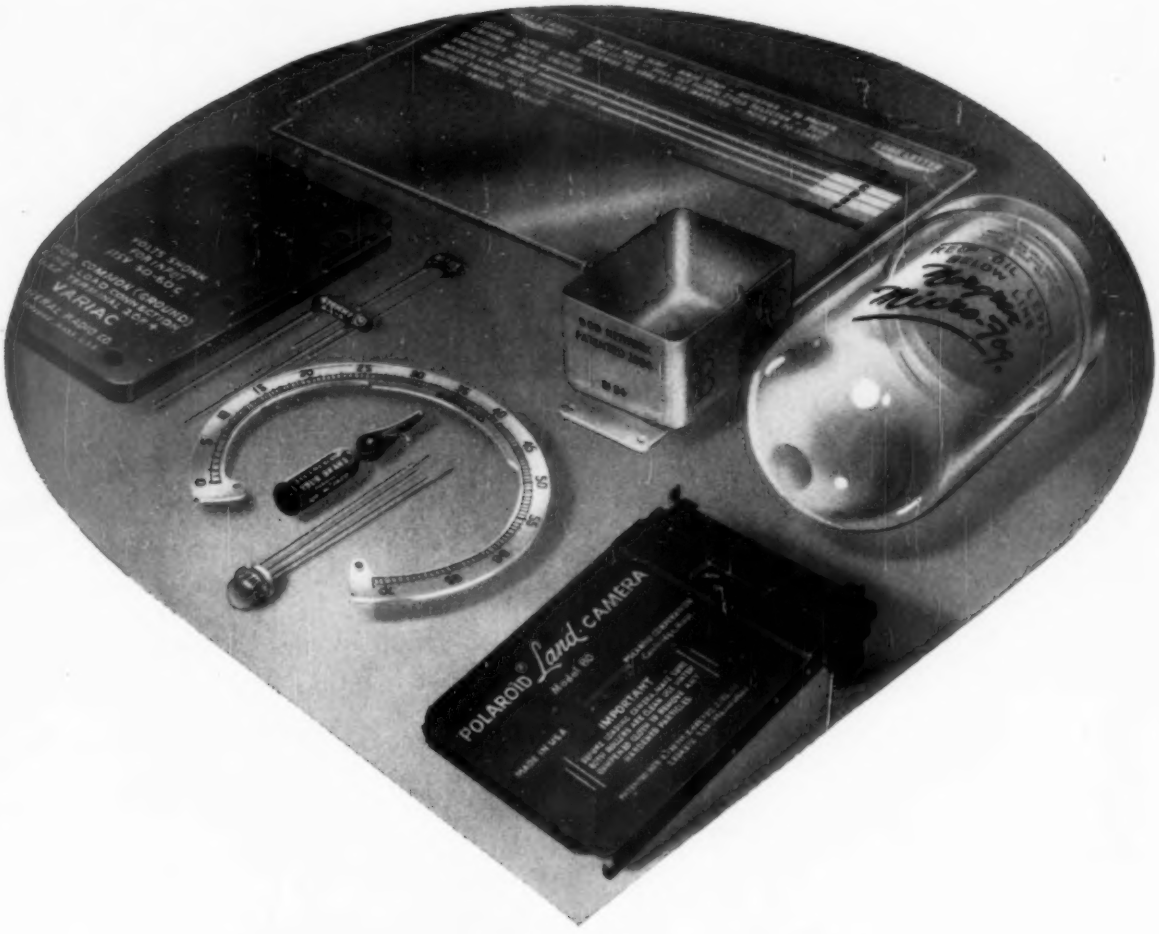
FACTORY is a consolidation of Factory Management and Maintenance and Factory and Industrial Management and Maintenance Engineering.

Factory and Industrial Management grew from consolidations, mergers, or absorptions involving the following publications: The Engineering Magazine; Industrial Management; Factory, the Magazine of Management; Management Engineering; Administration; Management and Administration; Management and Administration in Manufacturing Industries; Manufacturing Industries.

Maintenance Engineering grew from consolidations, mergers, or absorptions involving the following: Review of the Telephone and Telegraph; Electrical Review; Western Electrician; Electrocraft; Electrical Engineering; Electrical Review and Industrial Engineer; Industrial Engineer; Industrial Engineering; Industry Illustrated.

In addition, features of the publication Timely Ideas have been added.

All rights in the above names are reserved by the publisher.



You know how to make it — we'll show you how to mark it

When a new product has to be marked — or the imprint on a present one improved — how do you solve the problem? Perhaps you've tried building your own marking equipment, and later found the results didn't justify the investment in engineering time and money. Possibly existing equipment was modified to do the job, or a "quick bargain" machine was bought — and the price paid was poor marking quality, inflexibility, or production delays because of a slow process.

Every one of these pitfalls can be avoided by a single step: call in a Markem field engineer at the start. He'll study what you have to mark, ask a lot of questions about how many and how fast, what handling your product gets, how often the imprint must be changed, whether you want marking to be a separate operation or right in your line. Then, after thorough study by Markem, he can tell you *exactly* what Markem machine, type and specialty ink is best for your job, how fast they will mark your products and how much it will cost.

The machine, most likely, will be one from more than 40 standard, basic Markem groups. After spending nearly 50 years building marking equipment and nothing else, Markem has machines and inks to identify or decorate almost any size, shape and material you can name — and new equipment is constantly being developed.

The advantages to you can all be summed up this way: why spend *your* valuable time, money and talent trying to lick a new marking problem — when Markem has probably already solved it, or one just like it, for someone else? For marking parts or complete products . . . containers and packages . . . tapes, labels, tags and scores of items, the *right* marking method — with Markem equipment — will provide the quality and economy you need. Write Markem Machine Co., Keene 18, N. H.

MARKEM

EVERYTHING INDUSTRY NEEDS . . . FOR PROFITABLE MARKING . . . SINCE 1911

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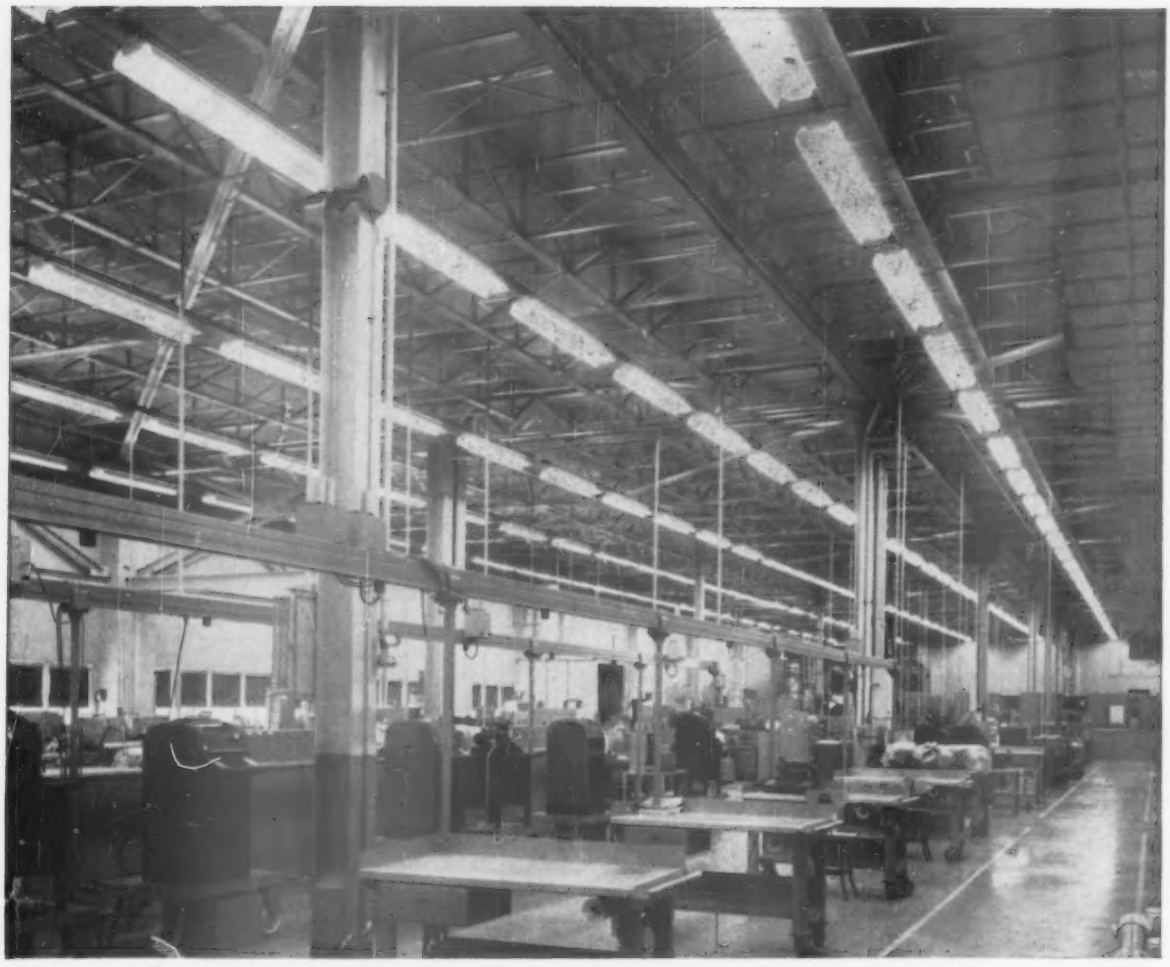

Day-Brite CFI-10® 800-MA High-Output Rapid-Start fixtures provide "Comfort For Industry" for every industrial application. Here they light the way to accuracy and efficiency in Western Electric Company's Phoenix distributing house. NEW STATE ELECTRIC CO., *Electrical Contractor.*

DAY-BRITE LIGHTING
saves time when minutes mean dollars

Comfort Lighting means faster seeing, faster working, bigger profits.

When Day-Brite equipment is specified, you get all of these and savings, too.

Day-Brite fixtures are designed, pre-assembled, and packaged to save wiring and hanging time. And Day-Brite equipment is easy-to-clean and easy-to-relamp, to save maintenance time.

Your Day-Brite representative is prepared to show how you can save lighting dollars in operating, installation and maintenance costs. Why not give him a call? He's listed in your Yellow Pages. Z-449

Certified Lighting for a Better America

DECIDEDLY BETTER
DAY-BRITE
LIGHTING FIXTURES

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NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

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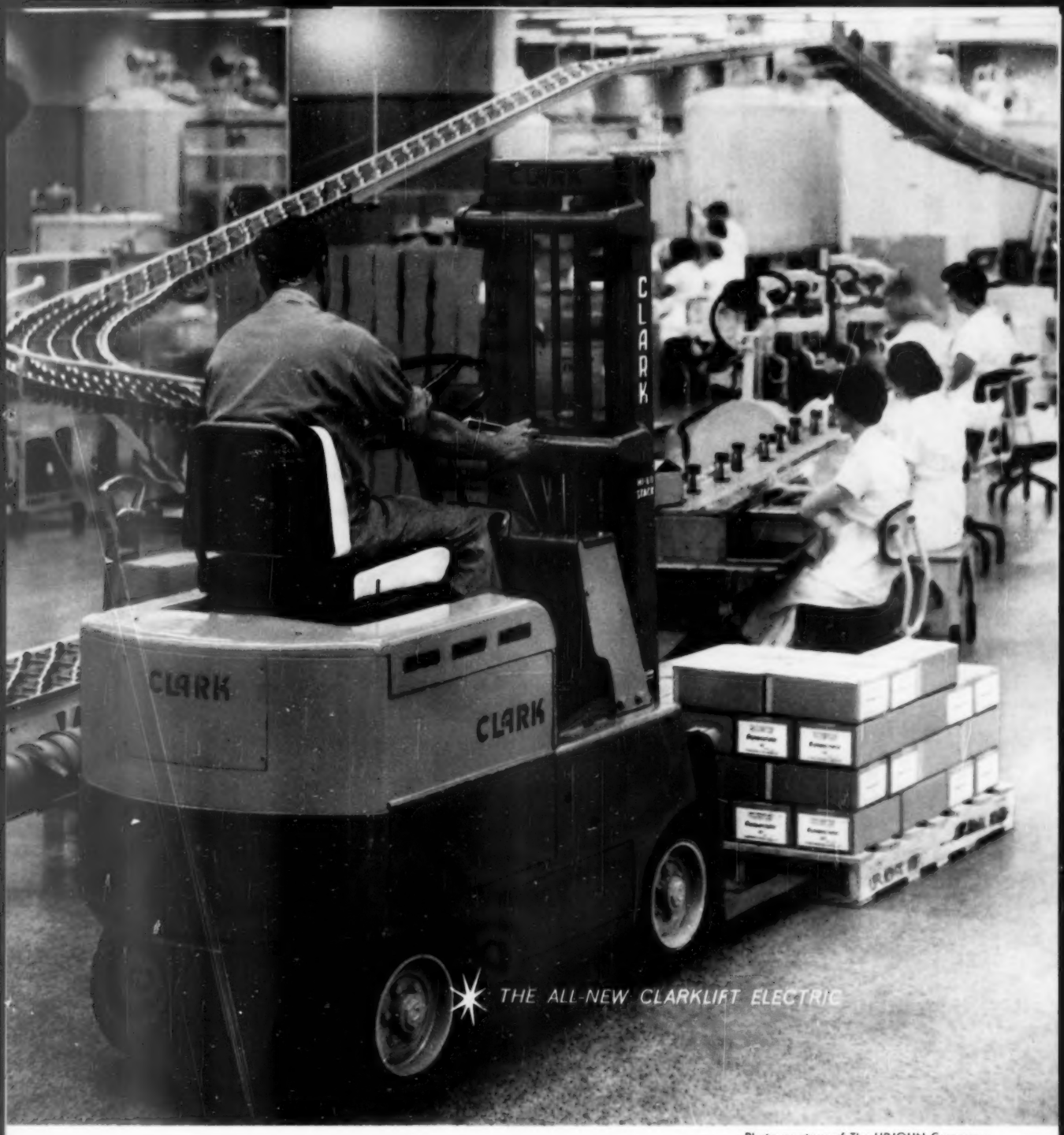

Photo courtesy of The UPJOHN Company

Now! Snail's pace to top speed...no jars, no jolts!

Entirely new! The only electric fork truck that provides smooth, "non-jerk" power-delivery under *all* working conditions.

On the all-new *Clarklift* Electric an infinitely variable speed control provides the *exact* torque necessary for different working conditions and assignments. On ramps, in congested areas, and particularly when inching or stacking . . . power is delivered with perfect regulation. Your driver has *complete* control of the travel speed of his truck at all times, resulting in greater efficiency and safety than ever before possible.

A new upright, one lever for both lift and tilt, self-adjusting brakes, unmatched accessibility are just some of the new features. There are many, many more. Send today for a brochure giving full details. Simply write: New Electrics, Clark Equipment Co., Battle Creek, Mich.

CLARK® EQUIPMENT

CLARKLIFT is a trademark of Clark Equipment Company

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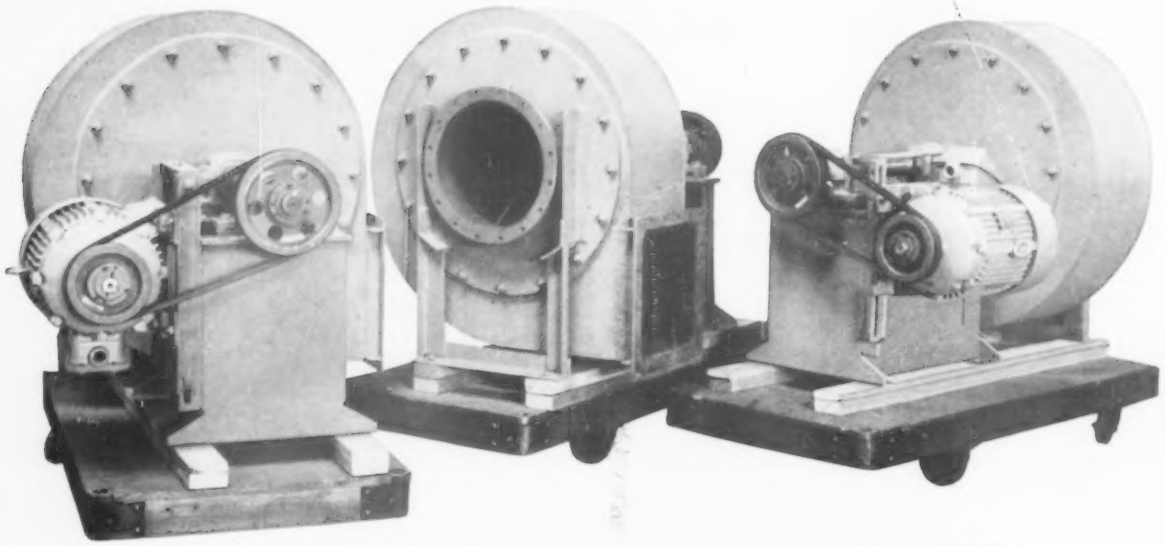
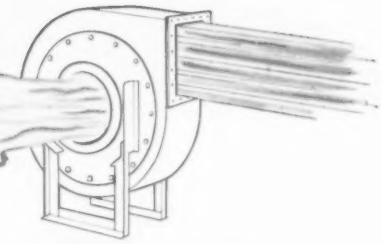


EXHAUSTING CORROSIVE FUMES



no problem for Clarage rubber-lined fans

Clarage's distinctively heavy-duty construction, plus the added advantage of special coatings, add up to far longer service life. Important savings for you!

The Clarage fans above are now serving as leach tank exhausters, handling fumes from a concentrated brine solution containing up to 5% hydrochloric acid. In this case, all interior fan parts are protected by a layer of rubber vulcanized to the metal. For other extra-severe applications Clarage fans can be treated with other special coatings, lead lined, or built of special construction.

If you're seeking fans that have what it takes — in every respect — call us in. CLARAGE FAN CO., Kalamazoo, Michigan.

Send for Bulletin 702-A

CLARAGE ... *dependable equipment for making air your servant*

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

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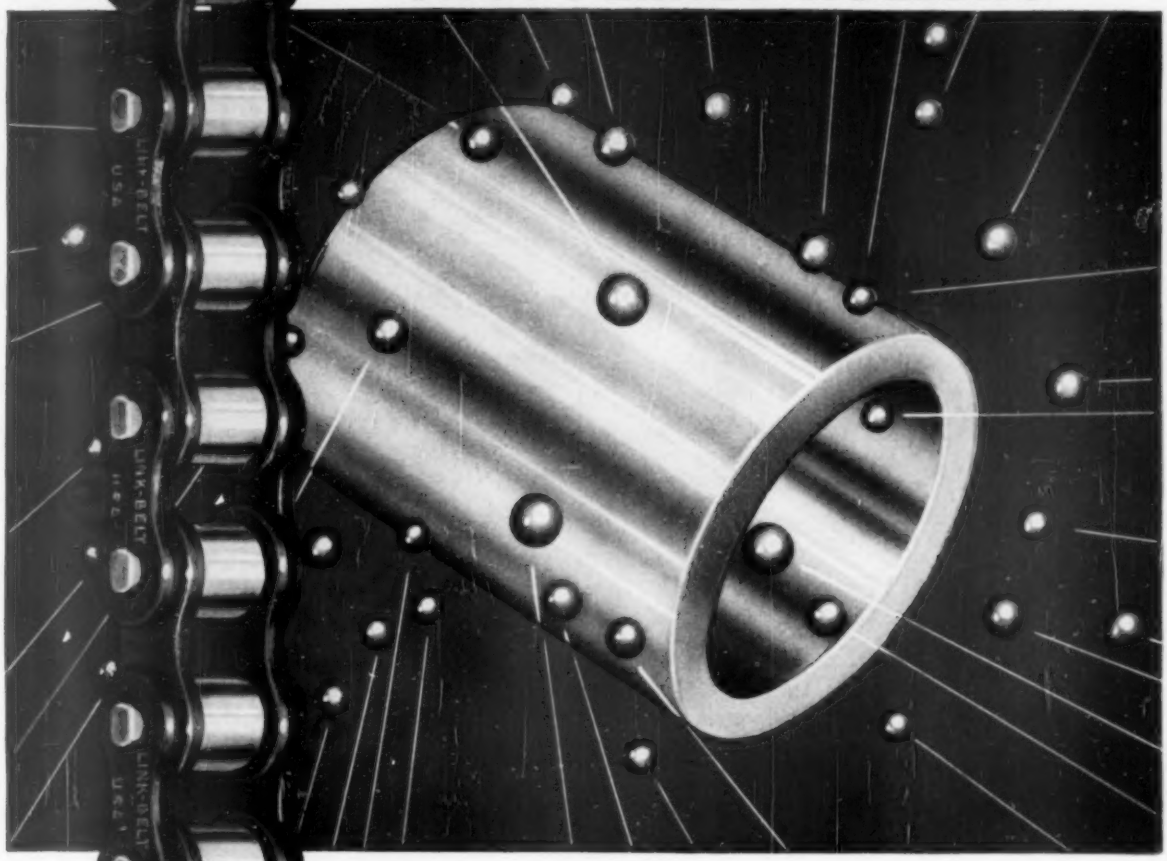
Shining example of "extra" chain quality

SILVER-BRITE

SHOT-PEENED ROLLERS



EXTRA LIFE IS POUNDED IN AND NOT POLISHED OUT

Rollers for Link-Belt precision steel roller chain are now finished by a special burnishing process to a "Silver-Brite" luster! And this is accomplished *without grinding away the benefits imparted by shot-peening*—a Link-Belt process that cold works the metal and provides extra fatigue life.

Many more special Link-Belt "extras" contribute to the dynamic strength so important for today's heavy loads and high speeds: close heat-treat control . . . lock-type bushings . . . pitch hole preparation . . . pre-stressing.

Ask your Link-Belt office or authorized stock-carrying distributor for new 154-page Catalog 2657—the most complete roller chain data book ever compiled.

LINK-BELT

ROLLER CHAINS & SPROCKETS

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 14,970

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SERIES NO

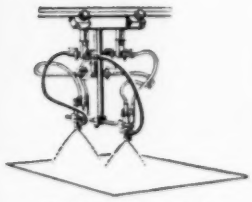
If you apply fluids anywhere in your process...

Consider DeVilbiss automatic spray...for control and uniformity not possible by any other method

Whether you're finish-coating products of any size or shape . . . applying adhesives, lubricants, glazes . . . or marking, stenciling, surface treating . . . it's time you investigated the DeVilbiss automatic spray method for your process.

With DeVilbiss automatic spray guns, you eliminate coating variations common to other methods; material use is constant; production rates uniform; and costs substantially reduced.

What's more, you can know in advance, without charge or obligation, the exact economies of automatic spray. We will simulate your operation in our fully equipped DeVilbiss research laboratory. Your supervisors are invited to be there. The results are passed along to you. Why not contact your nearest DeVilbiss representative, or write us in Toledo for all the facts.



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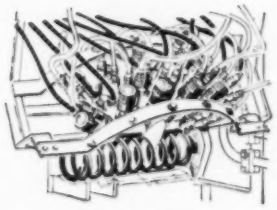

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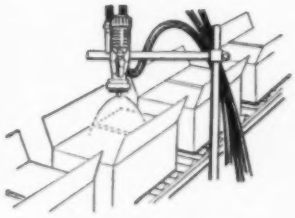
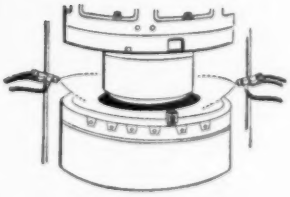


APPLYING ADHESIVES



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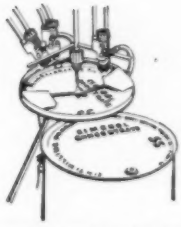

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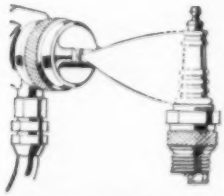

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THE DE VILBISS COMPANY

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DE VILBISS

OVENS • DUST COLLECTORS • INDUSTRIAL POWER WASHERS • FLOW & DIP COATERS • SPRAY BOOTHS
AIR COMPRESSORS • SPRAY EQUIPMENT • HOSE & CONNECTIONS • MIST-COOLANT UNITS

For more facts Circle 465 on Reader Service Card

National Wax Company, Skokie, Illinois, designed and built by Ragnar Benson, Inc., Chicago. O. A. Wendt Co., mechanical contractor, Chicago.

New Wax Plant Makes Varied Use of Pneumatic Control System

At the new National Wax Company plant in Skokie, Illinois, Johnson Pneumatic Controls provide flexible, precise regulation of process steam, hot water and air conditioning as well as of the comfort air conditioning, heating and ventilating systems. The photographs on the opposite page show examples of how this specially planned Johnson System solves the diversified control problems involved in producing petroleum waxes for the food and container industries.

Johnson has installed thousands of pneumatic control systems to meet the specialized requirements of industrial users. Johnson Pneumatic Controls are applied to all types and makes of air conditioning, heating, cooling and ventilating equipment and to a wide range of processes.

Besides providing reliable, high-accuracy control, a Johnson System offers important economic advantages. For example, pneumatic controls are simpler, have fewer components, are easier to understand and operate and require less supervision and maintenance than anything else you can use. Power consumption is but a fraction of that used by other types of controls. And, Johnson equipment does not require the type of periodic maintenance-replacement program that eventually replaces the system. *You pay only once* for, given ordinary care, a Johnson System can be expected to last for the life of the building.

Next time you have a control problem, why not investigate the performance features and operational savings offered by pneumatic controls? A nearby Johnson engineer will gladly give you the facts.

JOHNSON CONTROL

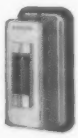
PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

R-1051
Static Pressure
Indicator-Controller

T-800 Remote
Bulb Thermostat

V-210 Three-Way
By-Pass Valve



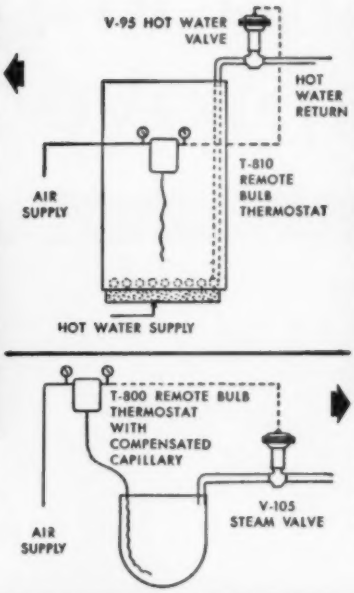
T-400
Room Thermostat

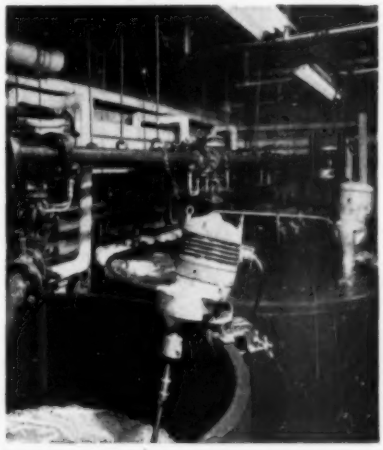
V-108
Three-Way
Mixing Valve

V-530 Precision
Pilot Positioner
applied to valve

D-225
Louver Damper

Tank Farm. Temperatures in twenty 12,000-gallon tanks for storing petroleum waxes are individually controlled by Johnson Thermostats and Valves. Wax is delivered in tank cars, heated to liquid form and piped in through heated lines.





Compounding. Ingredients are mixed in kettles containing up to 3,000 gallons. Kettle temperatures are controlled by Johnson Remote Bulb Thermostats which modulate Steam Valves to maintain a constant condensate return temperature.

Slabbing. Johnson Controls regulate the cooling system for the slabbing room where overnight 40 tons of hot wax are cooled to 40F for packaging in solid form. An economizer control arrangement cuts cooling costs by utilizing outdoor air instead of mechanically cooled air whenever possible.

Comfort Controls. The Johnson System assures an ideal working environment, includes individual room control of the office section air conditioning. Night setback feature keeps costs down. Shown at his desk is J. M. Packel, National Wax Company president, with W. J. Noll, traffic manager.

Johnson makes the most complete line of pneumatic control equipment for solving any problem of temperature, humidity and pressure control. Equipment includes thermostats, recorder-controllers, valves, dampers, damper operators, pressure regulators, humidostats, humidifiers, thermometers, switches, special controllers and related apparatus.

Complete engineering, sales and service facilities are available through 105 direct branch offices in the United States and Canada.

V-153 Sylphon Diaphragm Valve

T-1000 Recorder-Controller

D-251 Piston Damper Operator

JOHNSON SERVICE COMPANY
507-P East Michigan St., Milwaukee 1, Wisconsin

Please send me a condensed catalog of Johnson equipment.

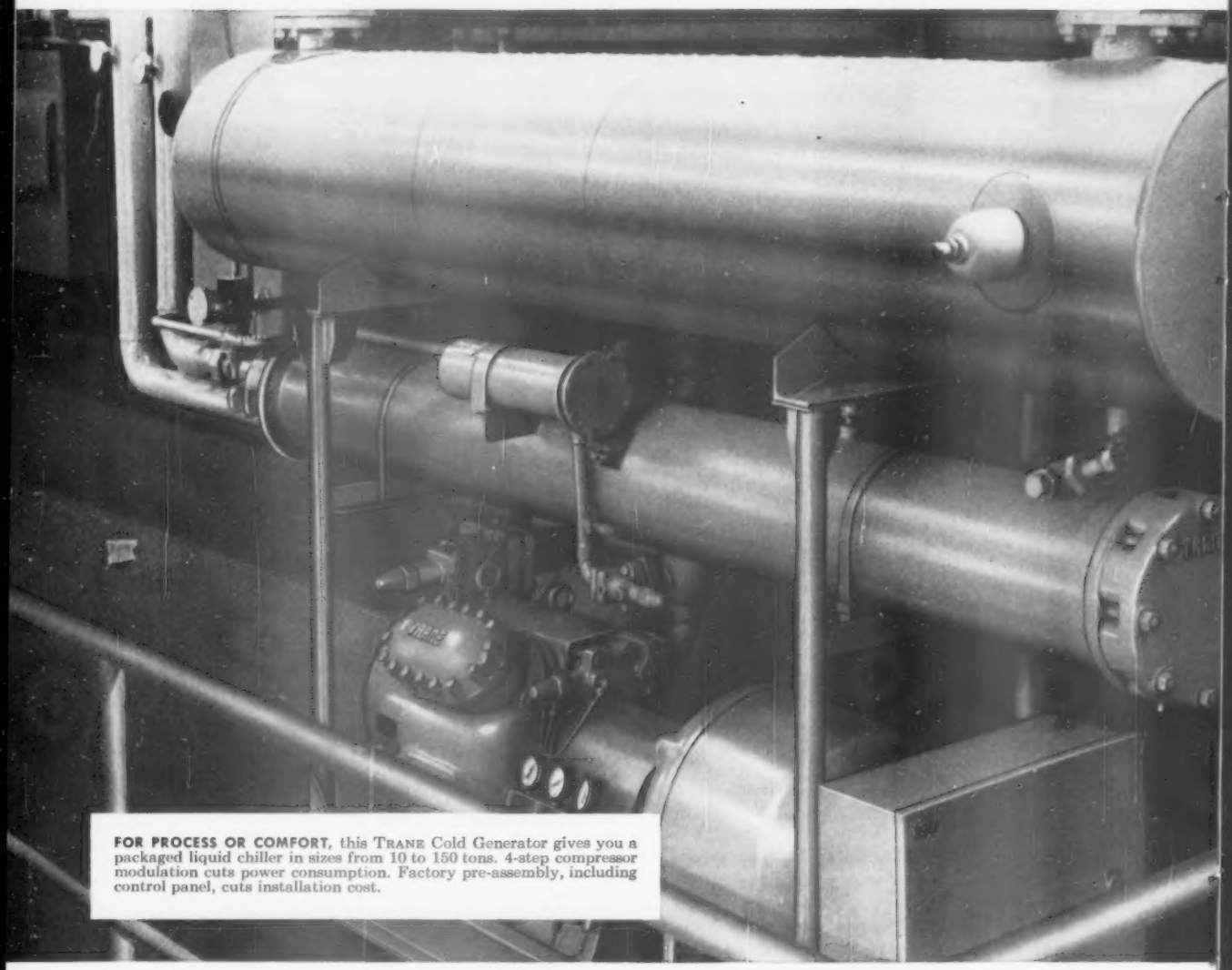
Name & Title_____

Firm_____

Address_____

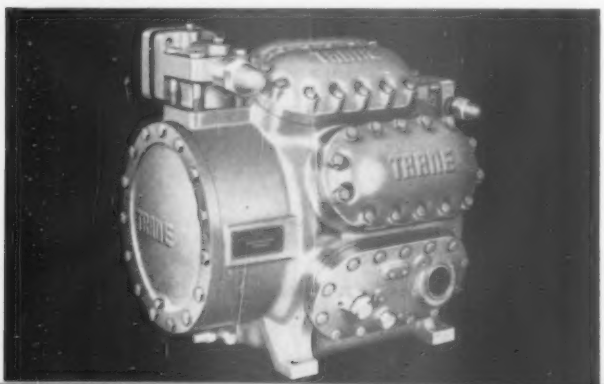
City & State_____

Cut your industrial
the improved Trane

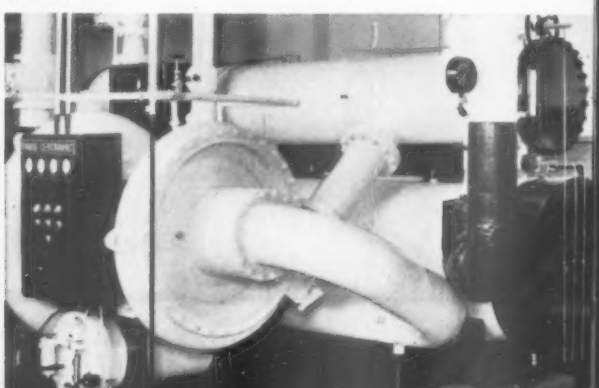


FOR PROCESS OR COMFORT, this TRANE Cold Generator gives you a packaged liquid chiller in sizes from 10 to 150 tons. 4-step compressor modulation cuts power consumption. Factory pre-assembly, including control panel, cuts installation cost.

NEW! Completely redesigned compressor is the heart of the TRANE Cold Generator. Designed for use with either R-22 or R-12 refrigerant, unit features simplified construction, with fewer moving parts; dynamically balanced for smooth, quiet operation; less starting and stopping cuts power costs, adds years to life.



FOR LARGER REFRIGERATION JOBS, this famous TRANE CenTraVac is now available in electric or steam driven models, open or hermetic design. All models modulate to 10% of capacity—or lower—with power savings in almost direct proportion to load.



cooling costs with Cold Generator

New compressor design assures smoother operation, increased dependability, longer life, easier servicing!

Now the TRANE Cold Generator liquid chiller is better than ever! A newly designed compressor—made for use with either R-22 or R-12 refrigerant—will cut your industrial cooling and air conditioning costs by providing years of dependable, trouble-free service. As the compressor is the heart of any water chiller, these improvements in the TRANE Compressor are important to any type of Cold Generator installation—process or comfort.

Check these Cold Generator Features

FACTORY-ASSEMBLED. A complete, packaged refrigeration unit designed to meet chilled liquid needs for almost all process or comfort jobs.

ECONOMICAL. 4-step compressor modulation cuts power consumption. Unit is complete—no further engineering, selecting or buying of parts is necessary. Once simple plumbing and electrical connections have been made, the Cold Generator is ready to serve any air conditioning system.

EASY TO INSTALL. Unit is factory-engineered, factory-assembled, factory-tested. No refrigeration piping is required. Ruggedly built . . . no special mounting base needed.

EASY TO MAINTAIN. New compressor (see below) has every part easily accessible for checking and service. And new lubrication system assures longer life, smoother operation.

VERSATILE. The TRANE Cold Generator is widely used for industrial process applications such as cooling dough, cooling rubber, cooling and maintaining constant temperature in electro-plating bath tanks.

For complete facts on the TRANE Cold Generator and other refrigeration equipment, call your nearby TRANE Sales Office. Or write TRANE, La Crosse, Wisconsin.

For any air condition, turn to

TRANE

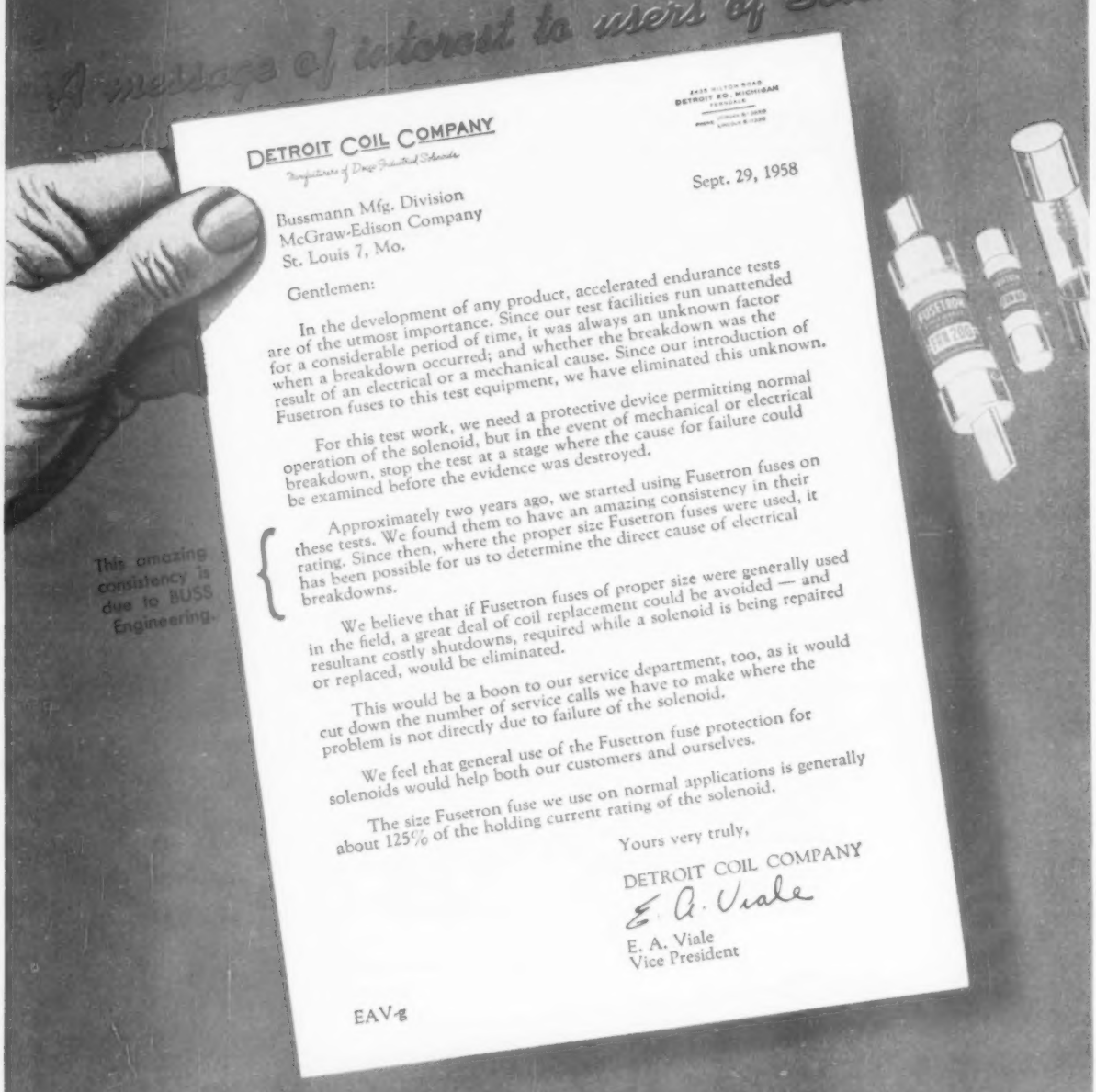
MANUFACTURING ENGINEERS OF
AIR CONDITIONING, HEATING, VENTILATING
AND HEAT TRANSFER EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA. • CLARKSVILLE MFG. DIV., CLARKSVILLE, TENN. • TRANE COMPANY OF CANADA, LIMITED, TORONTO
• 87 U.S. AND 19 CANADIAN OFFICES

TO COOL SMALLER AREAS, install a TRANE Self-Contained Air Conditioner. Commercial size unit (illustrated) available in 10, 15, 20, 25 and 30-ton capacities. De luxe units in 3, 5, 7, 10 and 15-ton sizes. All available with air or water condensing. Exclusive design features assure extra-quiet operation.

For more facts Circle 467 on Reader Service Card

A message of interest to users of Solenoids



DETROIT COIL COMPANY
Manufacturers of Dirge Industrial Solenoids

Sept. 29, 1958

Bussmann Mfg. Division
McGraw-Edison Company
St. Louis 7, Mo.

Gentlemen:

In the development of any product, accelerated endurance tests are of the utmost importance. Since our test facilities run unattended for a considerable period of time, it was always an unknown factor when a breakdown occurred; and whether the breakdown was the result of an electrical or a mechanical cause. Since our introduction of Fusetron fuses to this test equipment, we have eliminated this unknown.

For this test work, we need a protective device permitting normal operation of the solenoid, but in the event of mechanical or electrical breakdown, stop the test at a stage where the cause for failure could be examined before the evidence was destroyed.

Approximately two years ago, we started using Fusetron fuses on these tests. We found them to have an amazing consistency in their rating. Since then, where the proper size Fusetron fuses were used, it has been possible for us to determine the direct cause of electrical breakdowns.

We believe that if Fusetron fuses of proper size were generally used in the field, a great deal of coil replacement could be avoided — and resultant costly shutdowns, required while a solenoid is being repaired or replaced, would be eliminated.

This would be a boon to our service department, too, as it would cut down the number of service calls we have to make where the problem is not directly due to failure of the solenoid.

We feel that general use of the Fusetron fuse protection for solenoids would help both our customers and ourselves.

The size Fusetron fuse we use on normal applications is generally about 125% of the holding current rating of the solenoid.

Yours very truly,

DETROIT COIL COMPANY

E. A. Viale

E. A. Viale
Vice President

EAV-g

This amazing consistency is due to BUSS Engineering.

"A Great Deal of Coil Replacement could be avoided, and Resultant Costly Shutdowns Eliminated by Protecting Solenoids *with* FUSETRON FUSES."

E. A. Viale, VICE PRESIDENT
DETROIT COIL COMPANY

Protecting solenoids or other electrical equipment with FUSETRON Fuses—gives you greater safety, dependability and money-savings!

New!

The BUSS Add-On Fuse Block for the protection of solenoids or Small Motors on Multi-Circuit Equipment

The BUSS Add-On fuse block makes it easy to protect equipment of any kind where a number of solenoids or motors are used.

Blocks are made up of single pole fuse blocks that interlock into a unit fuse block of any number of poles.

Poles may be added or removed . . . to either end of assembled fuse block. This makes it simple to have a fuse block of just the number of poles needed and to fit the block to available space.

Each fuse can be used as a circuit disconnect.

Specially designed fuse clips permit one end of fuse to be removed from clip and fuse raised to right angle to block where it is held firmly in position — see picture above.

When working on machine this makes it quick to identify circuit that is open — and it assures that proper fuse will be put back in right circuit.

Write for BUSS Bulletin BL-1.

BUSS and FUSETRON fuses are available to fit these fuse blocks in ampere sizes up to 30 and for voltages up to 250. Write for BUSS Bulletin SFB.

FUSETRON dual-element fuses provide 10 point protection against electrical troubles—unlike circuit breakers or ordinary fuses which, except in rare cases, protect only against short-circuits.

Fusetron Fuses remain safe — with no maintenance or recalibration required. They are calibrated at the factory by engineers. Once properly installed, they require no inspection and resulting downtime necessary on mechanically operated devices. There are no hinges, pivots or contacts to stick or get out of order. Dust, corrosion or oxidation cannot increase a Fusetron fuse's capacity or lengthen its blowing time.

After years of inactivity, a Fusetron fuse will give the same safe, dependable protection if called upon to open as it would have on the day it was installed.

For more information, write for . . . Bulletin FIS on Fusetron Fuses.

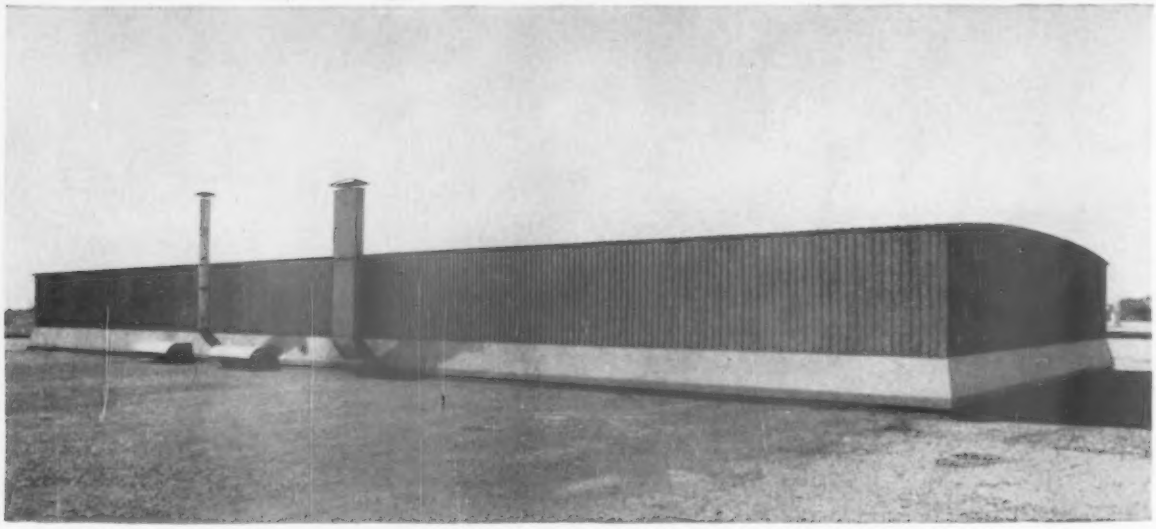
Bussmann Mfg. Division, McGraw-Edison Co., St. Louis 7, Mo.

159

Play Safe! Install Fusetron dual-element fuses throughout entire Electrical System.

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS
McGRAW EDISON
BUSSMANN MFG. DIVISION · St. Louis 7, Mo.

Processing EQUIPMENT...



Mahon Dehydrating Oven with Controlled Dew Point Installed on the Roof of the Copeland Plant, Sidney, Ohio.

COMPRESSORS are Dehydrated, Sealed, Inspected, Tested, Painted, and Charged with Refrigerant on ONE CONTINUOUS CONVEYOR PRODUCTION LINE!

Mahon Three Conveyor Line Two-Stage Metal Parts Cleaning Machine—Another Unit of the Compressor Processing Equipment Installed at Copeland Refrigeration Corporation, Sidney, Ohio.

The High Temperature, Low Dew Point Dehydrating Oven illustrated above is part of the modern straight-line production facilities for processing Compressors in the Copeland Refrigeration Corporation's plant, Sidney, Ohio.

When you need Processing Equipment or Special Production Equipment of any kind, you, too, will want to discuss methods, equipment requirements and possible production layouts with Mahon engineers . . . you'll find them better qualified to advise you, and better qualified to do the initial planning and engineering of equipment that will produce the desired end result at minimum cost per unit processed.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

Sales-Engineering Offices in Detroit, New York and Chicago

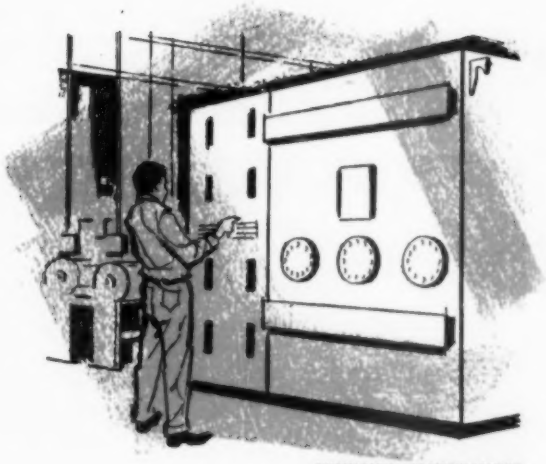
Engineers and Manufacturers of Complete Conveyorized Finishing Systems: Metal Parts Washers, Metal Cleaning and Rust Proofing Machines, Conveyorized Cleaning and Pickling Machines; Dry-Off Ovens, Spray Booths, Electrostatic Spray Enclosures, Flow Coaters, Dip Coaters, Finish Baking Ovens, and Paint Stripping Equipment; Core Ovens, Soldering Ovens, Dehydrating Ovens, Heat Treating and Quenching Equipment for Aluminum and Magnesium; Dust and Fume Control Installations, and Many Other Units of Special Plant and Production Processing Equipment.

See Sweet's Plant Engineering File for Information and Representative Installations, or Write for Catalogue A-659

. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

MAHON

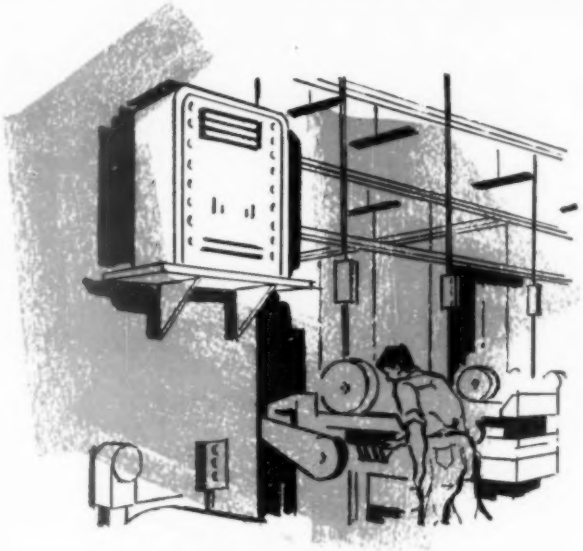
15% LIGHTER THAN
NEXT LIGHTEST TYPE



MINIMUM MAINTENANCE;
MAXIMUM RELIABILITY AND SAFETY

HERE'S WHY...

YOU SAVE BY SPECIFYING SILICONE INSULATED TRANSFORMERS



ANOTHER WAY TO SAVE
VALUABLE WORK AREA

Safer and more reliable, dry-type transformers insulated with Dow Corning Silicones frequently cost no more initially . . . and cost substantially less in the long run than liquid-filled types when savings in installation and maintenance are considered.

Easy, low-cost installation. Free of inflammable liquids and toxic fumes, silicone insulated transformers require no costly fireproof vaults, barriers, or ventilating fans. What's more, silicone insulated dry-type transformers can be located right at the load center . . . on floors, walls, or balconies . . . for added savings on costly, low voltage cable.

Less Maintenance. With no liquids to filter or change, dry-type transformers require only minimum upkeep. Silicone insulated *sealed* units are virtually maintenance free . . . require only periodic inspection of bushings, gages and transformer case.

Choose a silicone-insulated *open*-type transformer for balconies and other locations requiring minimum weight . . . a silicone insulated *sealed* unit for maximum reliability with minimum maintenance.

Greater reliability. Both sealed and open types reduce downtime by withstanding repeated overloads well above rated capacity. In addition, silicone insulation assures reliable power even when the transformer is exposed to high ambients, moisture or corrosive atmospheres.

For greatest reliability and lowest cost, it's wise to specify "Dow Corning Silicones" when you buy.

Send for your copy of a new booklet detailing the advantages of silicone insulated equipment.

Specify
DOW CORNING SILICONES
and *Save*

first in silicones

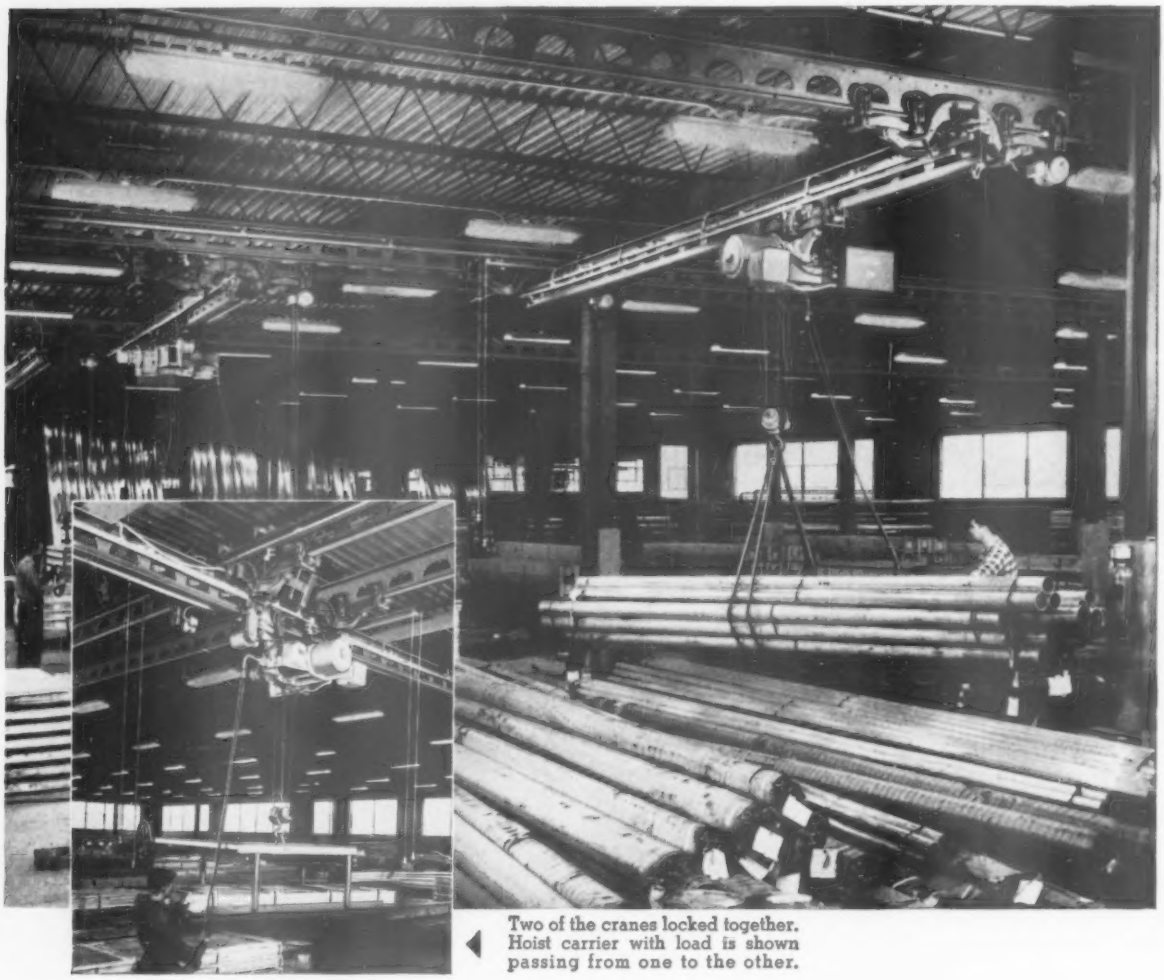
Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

For more facts Circle 470 on Reader Service Card

Large bundles of pipe, sheets, etc., are quickly handled from receiving dock to any spot in the warehouse *without rehandling* by the overhead Cleveland Tramrail transfer cranes. Whitehead Metal Products Co., Inc. specialize in a wide variety of nonferrous metals.

TRAMRAIL CRANES
SAVE WAREHOUSE SPACE
Improve Materials Handling Efficiency



Two of the cranes locked together. Hoist carrier with load is shown passing from one to the other.

In the large modern warehouse of Whitehead Metal Products Co., Inc., Cambridge, Mass., the entire job of unloading incoming materials, placing in storage and handling for outgoing shipments is done with Cleveland Tramrail transfer cranes.

The cranes have proven most practical for this service. They can transport long, unwieldy bundles of pipe in much narrower aisleways and turn them ninety degrees for piling without need of wide turnaround areas. As a result, an important amount of floor space is saved, and this provides considerable additional storage capacity.

Three cranes on separate, adjacent runways are used at Whitehead. However, there are only two hoist carriers, one of two tons, and the other of three tons capacity. Either can be transferred to any crane. The equipment is completely motorized, push-button operated. Conductors are SAFPOWRBAR. (SAFPOWRBAR electrification has been approved by the Underwriters Laboratories, Inc. and the Canadian Standards Association.)

Hundreds of warehouses handling materials of nearly every kind are profiting by installations of safe, dependable, time-saving Cleveland Tramrail cranes and track systems.

Write for free Engineering and Application Booklet No. 2008. Packed with valuable information.

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

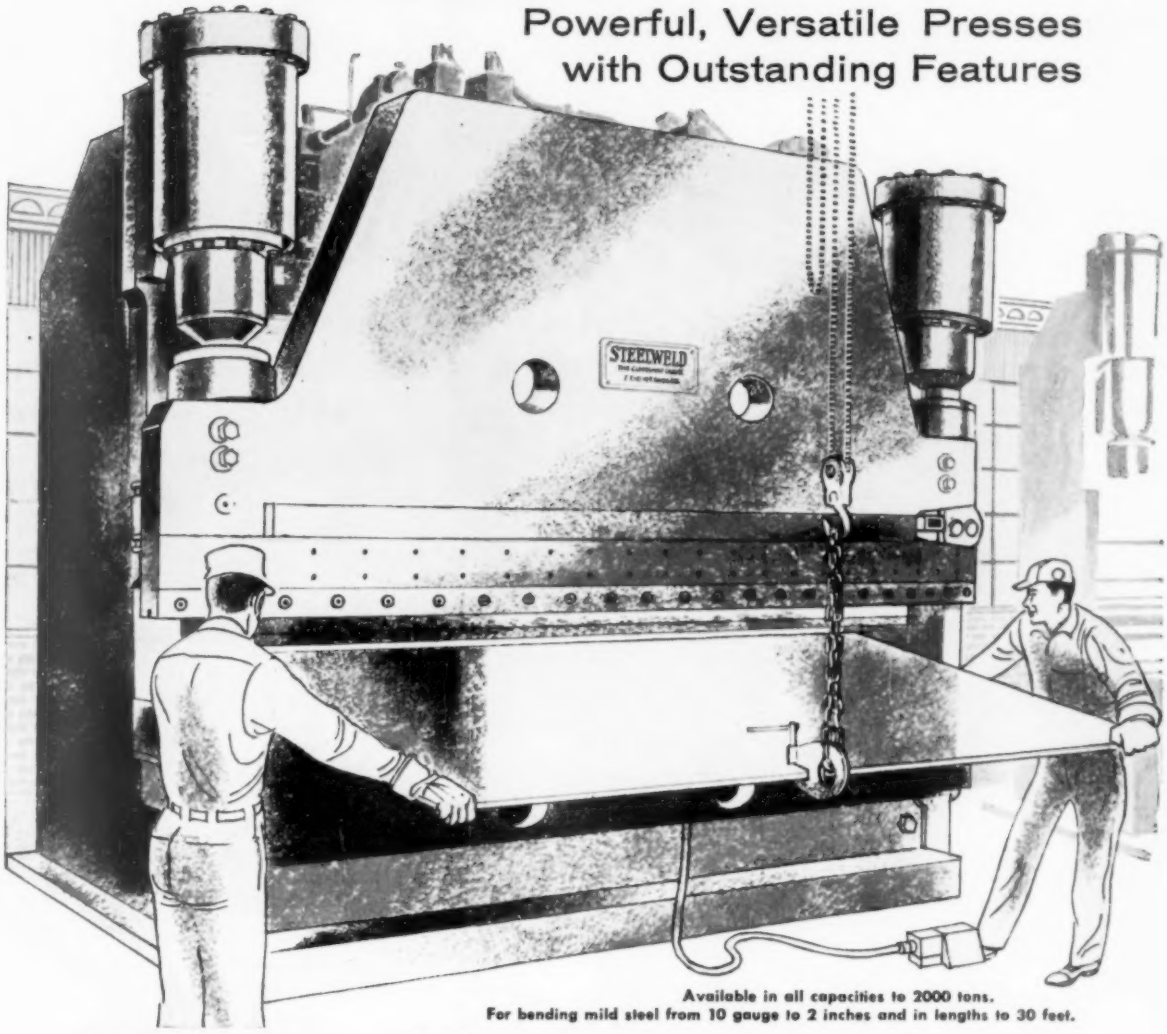
CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 3245 E. 290 ST. • WICKLIFFE, OHIO

For more facts Circle 471 on Reader Service Card

STEELWELD

HYDRAULIC PRESS BRAKES

Powerful, Versatile Presses with Outstanding Features



Available in all capacities to 2000 tons.
For bending mild steel from 10 gauge to 2 inches and in lengths to 30 feet.

- **Positive overload protection.**
- **Constant power during entire stroke.**
- **Ram reversible at any point.**
- **Stroke quickly adjusted for any length.**
- **Fast ram approach and return—slow-speed pressing.**
- **Operating pressure simply adjusted.**
- **Accurate ram level automatically maintained.**
- **Ram easily tapered.**
- **Simple, safe to operate.**

HEAVILY built and of finest quality throughout, Steelweld Hydraulic Press Brakes are of the most advanced design with all features desirable for ease of operation, maximum production and finest performance.

They are versatile machines capable of handling a wide variety of operations. They are ideal for jobbing shops, as well as for mass-production work. They work to close tolerances and have ample speed.

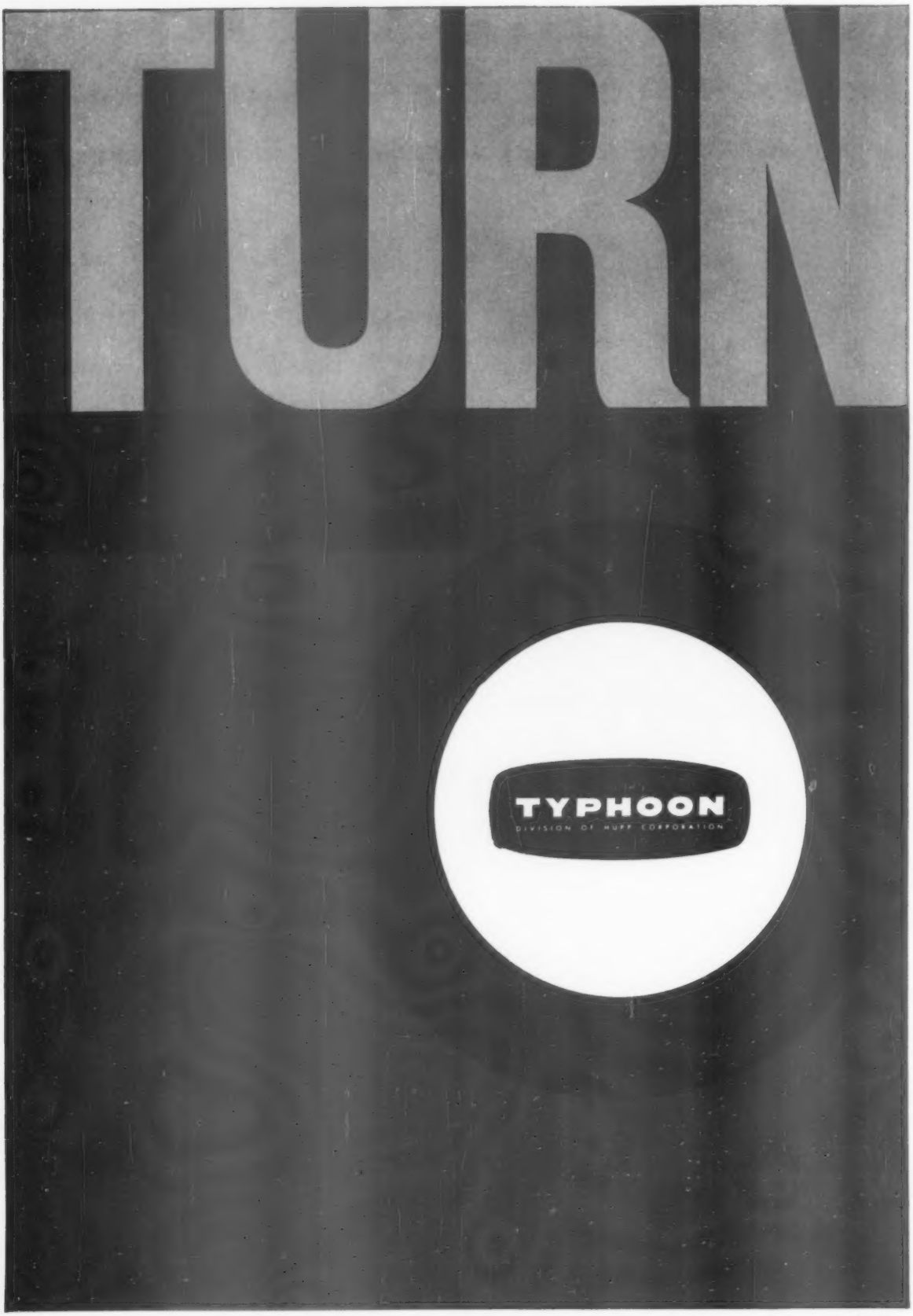
We urge you to get the facts on these outstanding brakes that have so much to offer you.

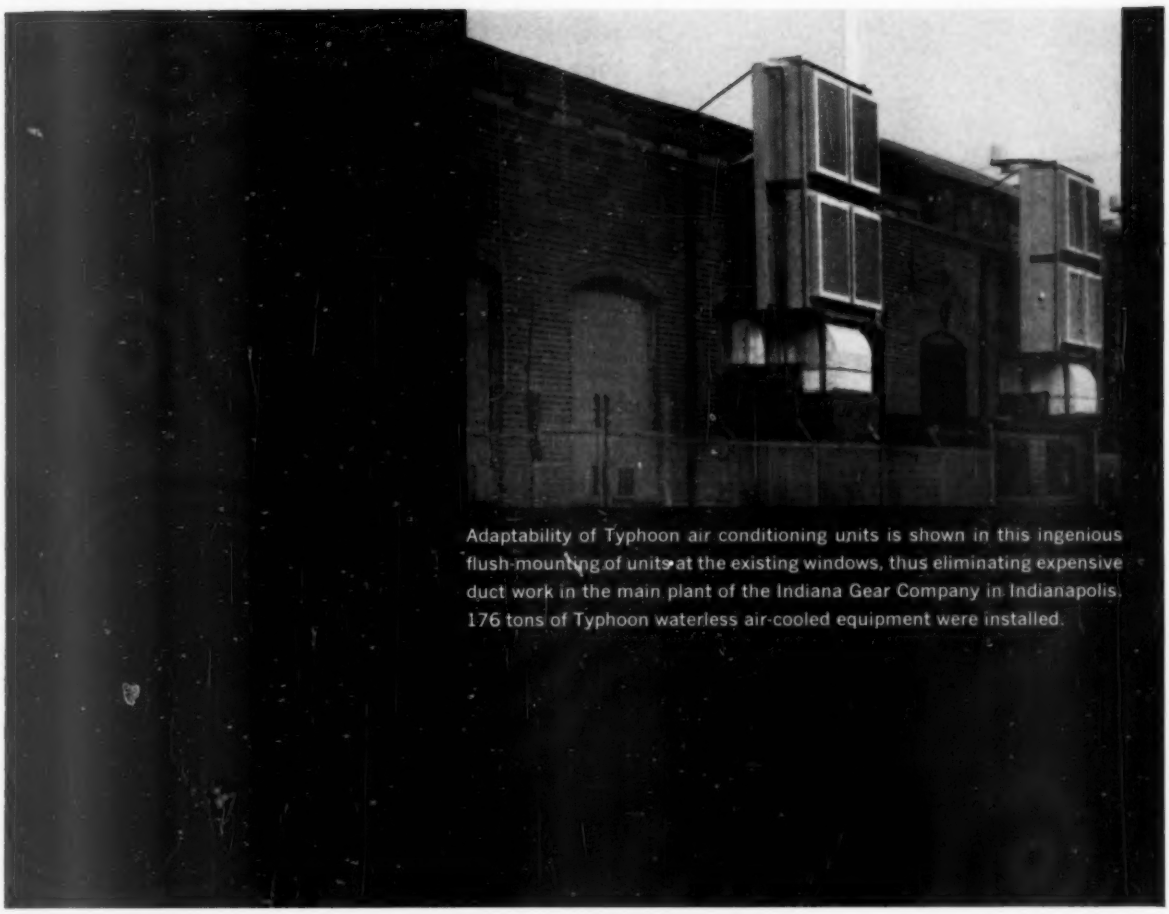
Write for free copy of catalog No. 2024A.

STEELWELD
HYDRAULIC PRESS BRAKES

Other Steelweld Machinery:
Hydraulic Shears; Mechanical Shears and Press Brakes; One-Two- and Four-point Straight-Side Presses; Hi-Draw Presses.

THE CLEVELAND CRANE & ENGINEERING COMPANY • 3271 EAST 281 STREET • WICKLIFFE, OHIO


TURN
TYPHOON
DIVISION OF HUFF CORPORATION



Adaptability of Typhoon air conditioning units is shown in this ingenious flush-mounting of units at the existing windows, thus eliminating expensive duct work in the main plant of the Indiana Gear Company in Indianapolis. 176 tons of Typhoon waterless air-cooled equipment were installed.

FOR AIR CONDITIONING THAT BRINGS GREATER PROFITS THROUGH GREATER PRODUCTION!

All over the world today, industrial organizations have learned that Typhoon Air Conditioning more than pays for itself by improving the volume and quality of worker output far beyond the added costs necessary for installation and maintenance. Consider these facts: Research has disclosed that a rise in employee efficiency from 2% to 4% will pay full cost of owning and operating a complete air conditioning system. Specific case histories have shown the following rate of increase in employee efficiency: drafting rooms—up 51%, stenographic pools—up 24%, hosiery factory personnel—up 29%, white collar workers—up 35%, general manufacturing—up 22 to 28%. Consider what such figures would mean to you! For over half a century, Typhoon equipment has been delivering comparable results in a wide variety of industrial installations. Custom designed units to meet your exact requirements at mass production prices. If space is a problem, Typhoon works out of doors, on the roof, ceilings, anywhere inside or out! For a giant plant, or a delicate research lab, Typhoon can deliver exactly the temperature and humidity control you need, with equipment especially designed for the purpose. Every Typhoon unit is equipped with extra size components that insure trouble free performance, save on operating and maintenance costs. **Typhoon Air Conditioning may be acquired and put to work under the new Typhoon Lease Plan. Conserves working capital, permits the installation to literally pay for itself out of earnings it generates. Or, it may be purchased under an installment plan geared to depreciation.** Find out why the top names in commerce and industry have chosen Typhoon Air Conditioning. Fill out the coupon now.

TYPHOON
DIVISION OF HUPP CORPORATION

Typhoon Air Conditioning Company, Division of Hupp Corporation
505 Carroll Street, Brooklyn 15, New York

☐ Have a representative call me for an appointment.
☐ Please send folder on air conditioning industrial plants.

Name_____

Title_____

Firm_____

Address_____

9A-11

"How can we squeeze 2½¢ out of production costs?"

Questions like this are nothing new to Ryerson specialists.

With their broad experience in steel applications, they can often suggest ways to save—a different type or analysis, steel in ready-to-use form, or an improvement in fabrication methods that will shave a few pennies off the final unit cost without impairing quality.

Add to this service the nation's largest steel stocks, unequaled processing facilities, fast delivery to meet any emergency—and you have the reasons why more steel users call Ryerson.

RYERSON CERTIFIED QUALITY

RYERSON STEEL

Member of the INLAND Steel Family

Principal Products: Carbon, alloy and stainless steel—tubing, bars, structurals, plates, sheets—aluminum, industrial plastics, metalworking machinery, etc.

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • WALLINGFORD, CONN. • PHILADELPHIA • CHARLOTTE • CINCINNATI • CLEVELAND DETROIT • PITTSBURGH • BUFFALO • INDIANAPOLIS • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

For more facts Circle 474 on Readers Service Card

FACTORY ... PRESS TIME REPORT • JANUARY 1959

Looking Ahead in Business

Any way you measure, business will have a very good year in '59. The economy may not have all the zip of '55—especially in autos, appliances, and housing. But prospects are for at least a modest boom by the year's end.

Total goods and services should run about $465-billion, according to first estimates. That's a gain of 6.5% over '58. It would put the economy back on the long-run growth curve by late '59.

•

Consumer buying will be the big prime mover. The surge will tie into the steady increase in incomes—more jobs, more overtime, higher wages.

Most important, real income per capita (income less taxes, adjusted for inflation and population growth) is moving up strongly. The trend was sideways in 1956-1957, actually declined in early '58. Now it's on the upswing.

It's not just higher incomes that make the consumer picture bright. Personal assets are at an all-time high. Despite the recession, consumers increased savings and trimmed installment debt by over $1-billion. And the Christmas sales surge shows people are again in a buying mood. Consumer expenditures should wind up well over $300-billion in '59—a new record and almost $15-billion higher than in '58.

•

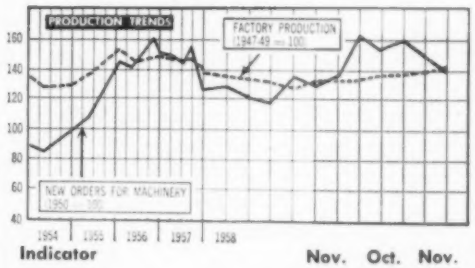
Government spending will also be going up by $5-billion or so in 1959. Defense outlays will be higher with the missile program moving into high gear. Though the President's budget is an "economy budget," Congress will almost certainly add to it—for housing, education, foreign aid.

That's just the federal budget. State and local budgets will also rise.

•

Business spending—third major sector of the economy—will also be on the rise. Heavy slashes in inventory and the decline in capital spending sent production into a nosedive last year. By contrast, business will be adding to its inventory to meet rising sales in '59—and will be boosting its capital investment.

FACTORY FIGURES OF THE MONTH



Indicator	Nov. 1958	Oct. 1958	Nov. 1957
New Orders for Machinery (exc. elec.)[1]	140.0	152.0	121.0
Contracts for Industrial Construction[2]	72.0	61.0	103.0
Factory Production[3]	143.0	140.0	141.0
Consumers' Prices (cost of living)[4]	123.8*	123.7	121.6
Industrial Prices (materials, supplies)[4]	126.8	126.4	125.9
Manufacturing Employment (millions)[4]	15.7	15.5	16.6
Total Employment (millions)[5]	64.7	65.3	64.9
Unemployment (millions)[5]	3.8	3.8	3.2

* = estimate

Sources: 1. McGraw-Hill Dept. of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1947-49 = 100); 4. U. S. Dept. of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Dept. of Commerce, Bureau of the Census.

All this adds up to a solid rise in business. What will forestall a rip-roaring boom? The boom is still possible. But the following factors will keep the economy in slightly lower throttle:

. . . *Consumer-goods industries won't have an "easy sell."* It will take new products, better selling, more advertising to generate a buying spree.

. . . *Family formation will decline temporarily over the next few years.* This will hit housing.

. . . *Excess capacity will restrain capital expenditures.* Also, the FRB will tighten credit quickly.

•

These factors really don't dim the '59 outlook. Many industries will set new records. For others the upturn means a firm recovery from the short but painful recession of '58. The important point: The New Year starts off with a bright outlook. It will get brighter as the year moves on.

Ideas of the Month

(For more information, circle item numbers on Reader Service Card next to back cover)

Figure Filberts needed to solve your plant problems? "Revolution Ahead" tells of a service (*Statistical Tabulating*) that may be just the ticket. **(312)**

No tumblers. Pick-proof. Burglar-proof. No keys to carry. That's what they're saying about a new electrical combination lock (*Max-A-Loc*). It works only when dial is rotated in proper sequence. **(313)**

Weldirectory is a new 20-page catalog and procedure guide (*Lincoln*) that tells how to use manual arc welding electrodes for hard surfacing. And for welding stainless steels, non-ferrous metals, and cast iron. Special feature: a handy-dandy hard-surfacing guide. **(314)**

Coffee on the spot from vacuum-packed cans. In newest coffee maker (*Vendo*) quarter-pound cans are punctured as needed, water is forced through, beverage drawn off, cans acting as disposable brewing chambers. **(315)**

Hard hats will welcome Skullgards (*Mine Safety Appliances*) because "fixed-crown" suspension assures proper clearance between shell and head. Hats and caps in nine colors—for quick identification of personnel. **(316)**

Yessir, vise gloves won't burr, won't scratch, won't damage delicate finishes. They're inexpensive rubber caps (*Rice*) for vise jaws. **(317)**

Booklet of the Month is new edition of 256-page, pocket-size data book (*Ryerson*). Includes aluminum analyses, characteristics, mechanical properties, tolerances, in addition to previously published info on steel. **(318)**

"The ABC's of Inflation" and "The Freedom to Invest" are just two of the timely titles in a series of six inexpensive, easy-to-read booklets (*Channing L. Bete Co.*) prepared for distribution to employees—and designed to give them a better understanding of the economic facts of life. **(319)**

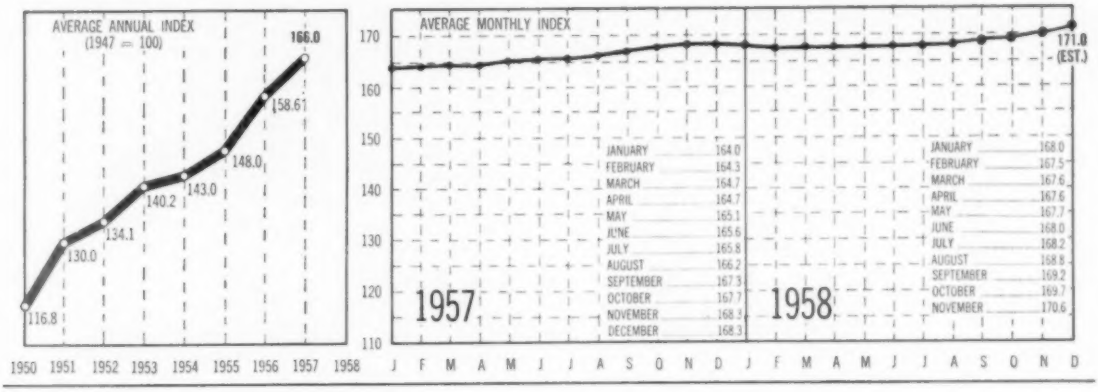
If you use screws or other fasteners in your product, Tri-Roll thread comparators (*Pratt & Whitney*) will make thread inspection fast, accurate. **(320)**

For materials handling fans—revised edition of "The Basic Concepts of Industrial Material Handling" (*MHI*). Free, of course. **(321)**

More Ideas of the Month on pages 88 and 89

FACTORY . . . PRESS TIME REPORT • JANUARY 1959

Cost Index of Plant Maintenance



Cost Rise Gains Speed

Trend will continue. But push may come more from labor than from materials.

FACTORY's Cost Index of plant maintenance is moving up very fast. The over-all Index hit 170.6 in November, a gain of more than 0.5% in just one month. Between August and November the Index rose by more than 1%. There has been a gain between the summer months and late fall in almost every year for which data are available. The gain shows up usually in August, stretches on to the end of the year. So it may be concluded that the present rise is a seasonal trend.

What happens is this: Wage rates are usually boosted in the spring and summer months. These wage increases are then passed along to consumers—factories and individuals—in the form of increased prices. Costs must necessarily follow the uptrend.

It now looks as if the Index will reach 171 in December. For the next few months the biggest push should be due to increased materials prices rather than to higher wage costs. Materials costs are being pushed up right now. Thirteen of the 39 materials in the Index cost more in November than in October. Only two items cost less, while the remaining 24 held even. The biggest increases in the month came in non-ferrous metals and items made of copper, zinc, lead, and aluminum.

Labor costs appear to be on the rise, too, with each of the five labor categories contributing to the over-all wage increase in November. But there's a good chance a major part of the current wage increase is over.

	AVERAGE 1957	NOVEMBER (Preliminary)	OCTOBER (Revised)
Building and Facilities Index	156.9	178.9	178.4
Materials	140.6	141.2	140.9
Brick	147.8	149.1	149.0
Elec. fixtures	128.0	128.9	128.9
Elec. switches, boards, fuses	175.7	180.8	180.8
Elec. wire, copper	136.6	130.5	127.1
Glass	152.6	151.5	151.5
Gutters, spouts, ducts	169.4	178.8	177.1
Gypsum products	134.5	140.8	140.8
Heating equipment	128.2	127.4	127.4
Lumber	126.7	127.1	127.9
Millwork	147.1	149.5	149.5
Paint	128.1	130.0	130.0
Pipe, cast iron	165.8	170.4	170.4
Pipe, steel	188.1	198.7	195.8
Pipe & tubing, copper	156.0	148.6	144.1
Roofing	129.8	126.4	126.4
Sanitary fixtures	151.4	147.8	147.8
Sash, metal frame trim	145.7	145.2	145.2
Solder	121.2	122.6	118.5
Steel, structural	222.0	236.3	236.3
Tanks, steel	138.3	138.3	138.1
Valves & fittings	159.9	163.1	162.7
Wire mesh	166.9	161.9	161.9
Labor	167.7	178.9	178.4
Carpenters	154.6	163.6	163.1
Electricians	174.5	188.7	188.2
Painters	174.0	184.4	183.8
Equipment Index	169.9	173.6	172.4
Materials	167.7	169.9	170.0
Abrasives	154.1	160.4	160.4
Alloys, non-ferrous	127.2	123.9	121.9
Bars & plate, steel	214.8	227.2	227.2
Bearings	166.2	160.3	160.3
Belting	150.9	150.2	150.2
Bolts, nuts & screws	222.9	225.3	228.7
Chain	177.6	184.0	184.0
Controls (electrical)	175.7	180.8	180.8
Gear-reduction units	180.4	181.7	181.7
Hand tools, mechanics	185.1	195.0	193.0
Lubricants	87.8	80.1	80.1
Motors	143.5	148.3	148.3
Non-ferrous metals	133.3	128.1	125.2
Precision tools	150.2	153.2	153.2
Pumps	177.2	188.4	183.6
Tools, cutting	162.3	168.4	168.4
Valves & fittings	159.9	163.1	162.7
Labor	171.5	176.1	174.1
All mfg. labor	167.5	175.5	173.1
Machine tool labor	175.4	176.6	175.1
FACTORY'S COST INDEX	166.0	170.6	169.7

FACTORY . . . PRESS TIME REPORT • JANUARY 1959

Looking Ahead in Labor

The danger flag is up for 1959 bargaining. You can only guess where trouble may start. But labor and management are betting it will come.

•

The hard-core negotiations center on basic steel and aluminum, fabricated metals, rails, rubber, and meat-packing. Long-term contracts run out in some of them. In others a showdown was postponed from '58 negotiations. It adds up to much more than hard bargaining. Here's why:

Warnings showed up late in '58. Surprise strikes broke out in airlines, newspapers, farm equipment. The atmosphere hardened on both sides.

Labor is in a bargaining split. Demands will be paced to improved production. But they'll be directed at employers who paid high during recession under long-term agreements.

Management is getting its back up—joining together to resist unions. New employer alliances—formal and informal—showed up in auto, newspaper, and airline bargaining. This trend will grow.

Inflation may light the fuse. Labor's wage-cycle demands are being blamed for the steady climb of living costs. Businessmen are taking harder stands. They'll risk a strike quicker. The public is swinging to their side.

•

There's some supporting economics in the picture. The '58 auto settlements, with a 6¢ minimum, are hardly a boon to labor. In other years, the UAW has led the parade, taken others along. This time, the UAW's built-in pay jump of 6¢ falls behind the more-than-8¢ average for the rest.

Thus the union "floor" is shakier in '59. Also some 4-million got deferred increases in '58. Less than half come up for automatic adjustment in '59.

If business advances, union leaders will raise their sights with rising production. Union negotiators got around 9.5¢ in the '58 average—slightly under the previous year. Labor will want more in a year of better business.

Another demand is getting up steam. This year the shorter workweek will get serious attention. It has been traded off in bargaining up to now.

But labor leaders say they learned a lesson in the '58 recession. The jobs lost then have not opened up. Production is climbing back to normal. But employment isn't following. This is true in steel and autos. It has followed in related industries.

Labor's emphasis in bargaining in the months ahead will be to save jobs. This means demands for higher severance pay, longer vacations, retraining. But the big, new demand will be a workweek cutback.

•

In mid-'58 Reuther talked a shorter workweek but gave it up. Watch for it again in steel. This time the demand is likely to stay. Job saving will also be a major topic in rail negotiations. Both are vital this year. Both industries are winding up three-year contracts—steel in June, rails in October.

Before these, however, keep an eye on two other industries. Oil-industry bargaining in '58 was still a long way from settlement in December. This could boil over into the first dispute for '59. And the showdown in rubber comes along in April.

•

New employer techniques to resist union demands and damaging strikes are being developed.

The auto industry, which came off with a good '58 settlement, had no official alliance. But the companies held at the same wage offering. Then six airlines facing labor troubles with pilots, engineers, and machinists wrote a mutual aid pact. It provided that all extra revenue gained during a strike would be given to that airline. In the news deliverers' strike in New York, all newspapers shut down when a printers' local at one newspaper refused to cross the deliverers' picket line.

These management moves are more and more becoming the answer to union strikes. Employers have watched unions combine successfully in strikes—refusal to cross picket lines, for example. Now employers are testing this practice themselves.

SEE LABOR RELATIONS NEWS, PAGE 200

Are YOU still using pallets?

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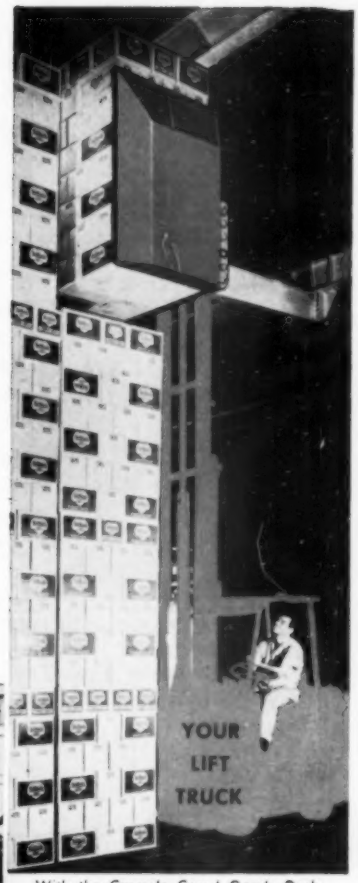

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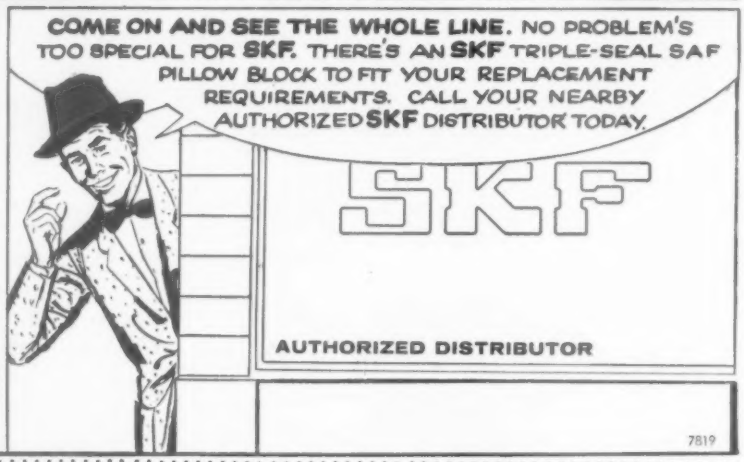
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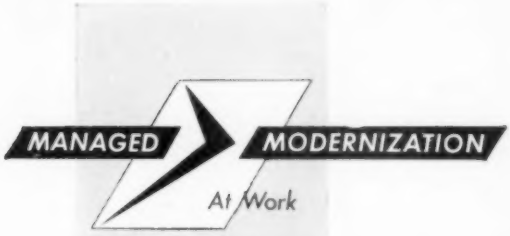


You'll see the symbol at the right every month in 1959. Each time you see it, it will signal another FACTORY report on the way smart modernizing cuts costs and boosts efficiency. It's our theme for '59. We call it . . .

Managed Modernization at Work

AS WE SEE IT, putting Managed Modernization to work in your plant must be your prime target for '59. We know of no better way in which you can spend your own time and effort and your company's money. We know of no better way to buy an insurance policy against the creeping obsolescence that is sapping the vitality of all too many plants in the country today. And we know of no better way to build yourself in your organization—as the kind of man who spots the really important problems and spends his time well in solving them.

Does Managed Modernization pay off? Or is it just another of the superficial pep talks you hear or read all too often these days? We can't blame you if questions like these come to mind. In answer, all we can say is this:

We can prove every word of our pep talk. We can prove it by example, by hard fact, by evidence of payoff. And we propose to do so in this issue (starting right on the next page) and in every issue for the rest of this year. We editors aren't going to lecture you or tell you what *we* think you ought to do. We're just going to let the successful experience and the smart ideas of men like you tell the story—men with problems and responsibilities like yours. If they can make Managed Modernization at Work pay, so can you. In fact, so *must* you. For "they" could be (and probably are in some cases) your competitors.

So here's FACTORY's first step in Managed Modernization at Work for '59. It's a special report based on the experience of 16 plants, big and small, in a variety of industries. Last year these plants made *their* modernization dollars work double-time for profits. If you want to do the same in your plant this year, here are some of the steps they advise:

- You must get all your operating managers into the modernization act (page 42).
- Only with well-laid plans will you keep your plant from growing obsolete (page 47).
- Marketing information is still the least-used guide to an up-to-date manufacturing process—but potentially your most valuable guide (page 50).
- Small plants will have to learn to modernize faster if they want to stay in business (page 52).
- You shouldn't rely on just one project for achieving modernization. There are lots of ideas you can use (page 54).
- You should wake up right now to the need for modernizing your management organization as well as your plant and equipment (page 57).

Now, to see how Managed Modernization works — and pays off — in 16 manufacturing plants across the country, read on.

MANAGED MODERNIZATION At Work

Takes a lot of people—working in teams—to spot modernization opportunities, plan action, and make it pay off. Here, from an old line manufacturer, is an example of . . .

Making Managed Modernization Work

THAT'S A TEAM of plant operating managers on the facing page. They're injecting new spark, new efficiency, into the manufacturing life of an old company. What they're doing will prove to you that modernization—right now, pays off. Even if your facility is (like theirs) scheduled for replacement in 8 to 10 years.

Those men are standing in the middle of the company street of DeLaval Separator Company (Poughkeepsie). On the right, a row of narrow buildings. Smack in the middle, the powerhouse. The Hudson River laps at the far walls. At left, a string of multi-story buildings. Beyond, the main line of the New York Central Railroad. Beneath the tracks, a tunnel to two manufacturing buildings. Other buildings are scattered half a block up the road. Near by, a fancy office building (1951)—you get there by car.

What would you do? Probably what DeLaval plans to do—move out. Fact is, DeLaval has bought a 60-acre tract and engineered and approved plans for a new plant on the other side of town. But it will be a few years before volume and company finances permit construction.

What would you do meanwhile? Wait it out on minimum maintenance? Not DeLaval. Austin Company (Cleveland) made an engineering study of DeLaval's manufacturing processes, looked for problems that would justify a new plant, found plenty.

FOR TODAY, THE BEST

Half the problem answers that Austin found, while better solved in a new plant, could be adapted for the old facility. For example, the study showed one separator was moved 2¼ miles (9700 ft.) in process. Today travel has been cut to 230 feet.

That's only one example of modernization effected since 1955. There are lots of others, like these:

- Bad eyesores got first priority. Old, unused sheds and buildings were knocked down. Unused smokestacks were knocked over, buildings painted. Landscaping was added.
- Employee facilities got next attention. Theory: Good work comes naturally in a good plant. Washrooms were renovated, all fixtures replaced. Employee parking lot was paved, the hospital improved.
- Plant interior was newly lighted, newly painted, newly floored. Aisles were painted in—and are kept painted and clear.
- Process improvements were effected as fast as they could be developed. Today there's a new rubber molding machine. Rubber trimming is now done with CO_2. Packaging has been overhauled, machining improved, and several new test methods developed.
- Storage areas were consolidated. Storage space was cut 30%. A room previously used for cutting-oil reclamation (water-soluble oils are being used, discarded after use) is now a packaging-materials storage area.
- Materials handling was reduced enough to cut power-truck needs from 4 to 2. Shipping and receiving were joined at a new dock facility, convenient for trucks and railroad cars. Pallets have replaced skids. Active warehousing and operations have been moved to the ground floor. Second and third floors are used only for offices and dead storage.
- Organization has been changed. At top levels more men now have line responsibilities. Some functions are centralized (for example, cost, methods, planning, and scheduling groups). Inspection has gone the other way—from central to departmental. But a central toolcrib has been set up. Organizational changes have been made almost entirely with existing personnel.

Now for more modernization ideas you can apply in your own plant. . .

. . . *turn the page*

AT WORK on modernization are Clyde R. Purdy (left), DeLaval's plant superintendent; W. A. Neumann Jr., president; Robert J. MacDonald, industrial engineer; and Ralph E. Williams, works manager.

MANAGED MODERNIZATION At Work

Begins on page 42

To modernize, you can clear space...

. . . for handling, the way DeLaval did. Knocked-down buildings will make room for trucks serving shipping, receiving. Narrow street wouldn't let trucks back up to dock. Rail track, still used, will stay.

You can make your guests comfortable

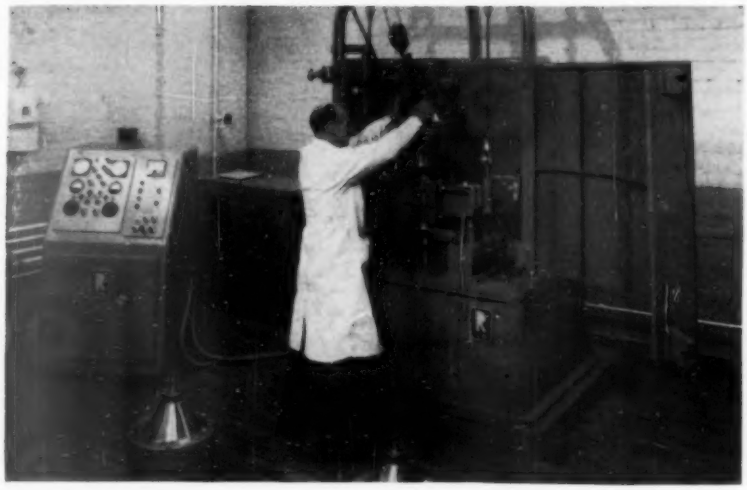
. . . when they visit your plant. DeLaval's old reception building was an eyesore. It embarrassed everybody who had to meet a visitor there. This small but attractive reception building, painted red, solved the problem at minimum cost.

And you can reroof old buildings...

. . . after you've surveyed needs. In 1955 DeLaval's plant engineer made a complete study of roofs, determined the probable life of every roof on the property. Results: a new coating on the sawtooth roof (oldest in the United States), a new aluminum roof on the plant office building. Old office building roof was galvanized metal.

You can turn foundry into shop . . .

. . . and make it sparkle, too. Today DeLaval makes centrifuge bowls here, where the old foundry was. The Gisholts in the photo are brand new. Only big problem now: This machine shop and the sheetmetal shop are across the railroad tracks from the rest of the manufacturing areas and facilities.



New equipment will boost quality . . .

. . . and increase efficiency. This new balancing machine is the only one of its kind. General Motors Research built it for DeLaval. It incorporates a new concept in centrifuge balancing, does its work at 6200 rpm. Old balancers could run only at 550 rpm.

And space can be better used . . .

. . . like this area. It used to house the maintenance shops. It's now the sheetmetal shop, laid out for efficient work flow and handling. Maintenance is now centrally housed in a much smaller area in another building. Maintenance had just grown into the space in the building, had managed to fill it up. And efficiency had suffered as a result.

Turn the page

Begins on page 40

You can modernize your plant offices . . .

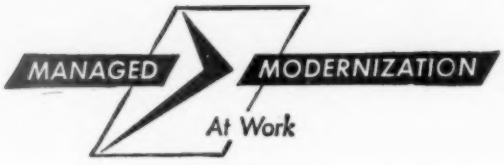
. . . and thus boost employee morale. What's new here? Lighting, renovated furniture, air conditioning, layout. Modernization here solved a morale problem, because the general office building, just a few blocks distant from this plant office, was a deluxe area.

Shipping and receiving can be a genuine pleasure . . .

. . . in quarters like these. The truck in the photo is just leaving an automatic airlock. Office to the right is new. Here, fork trucks are dispatched to plant areas by telephone. Note the new flooring—it's typical throughout the modernized plant. Bus duct overhead was installed during an interim layout, when this area was used for production.

Relayout can speed customer service . . .

. . . especially if you spruce up and brush up, too. This repair shop for customers once looked like most other shops of the same kind—jumbled up, disorderly, confused. Now it's a smart, well laid-out workplace. The aisle is new. Much of the equipment is new. And so is the lighting.



Continuous updating is the only way you can beat obsolescence. But you'll need a master plan for it. This company has one—and is using it today—for . . .

Master-Planning Modernization

"WHATEVER you do, Ed, don't ever let the plant get run down at the heels." That was the dictum The Heald Machine Company's president laid down to new Works Manager Edwin Keyes. That was 11 years ago. Keyes (who's now vice president as well as works manager) never forgot the president's words. In fact, through the years Heald (Worcester, Mass.) has developed a multi-pronged approach to keeping its plant just as modern as possible.

One good reason for a good-looking plant is that Heald is running a machine-tool showroom for the many customers who drop in to look at and inspect equipment in the test stages. But modernization pays off for manufacturing, too. Managed modernization . . .

. . . *Keeps Heald's plant competitive,* in precision requirements as well as costs.

. . . *Simplifies appropriation routines*—selecting, reporting, and selling the individual projects.

. . . *Sharpens its big asset—its employees.* Inspires them to work smartly, grow in their jobs.

Keyes believes that keeping the plant in dance-floor trim is more than one man's job. "It's a solid part of everyone's job," he says. That's the clue to the multi-prong approach. What are the angles? First, of course, there's the annual budget. Then there's a careful charting of the average age of production equipment. Next there's a three-year look-ahead that works as the present element of a long-range plan that has the label "The 19?? Plan." Heald also boasts an extensive programed maintenance plan and a consistent plan for improving worker benefits and working conditions. One by one, here's how these three plans work:

MAKING ANNUAL BUDGETS

First comes an operating budget, based on product forecasts. You say that isn't modernization? True, but it is a prerequisite to the capital expense budget—the plan for modernization spending. The capital expense budget is tied in with equipment needs for products to be made and with predicted profits as well as with the long-range plan.

Heald's capital expense budgets cover the improvement projects on which it plans to spend money during the coming year. Also the budget includes money for unspecified items—for the ideas and needs that come up during the year that are too good to wait for next year.

In addition to frequent periodic check-ups the company takes a second look at its budgets at midyear, changes them if it feels conditions or new ideas warrant. But there's often no change in the plans even if business seems to indicate that mild retrenchment is in order. For example, Heald went ahead with the purchase of a $175,000 Thompson grinder in 1958 despite the lackluster tone of business in general. It was an important part of reorganizing and updating the company's grinding de-

Begins on page 47

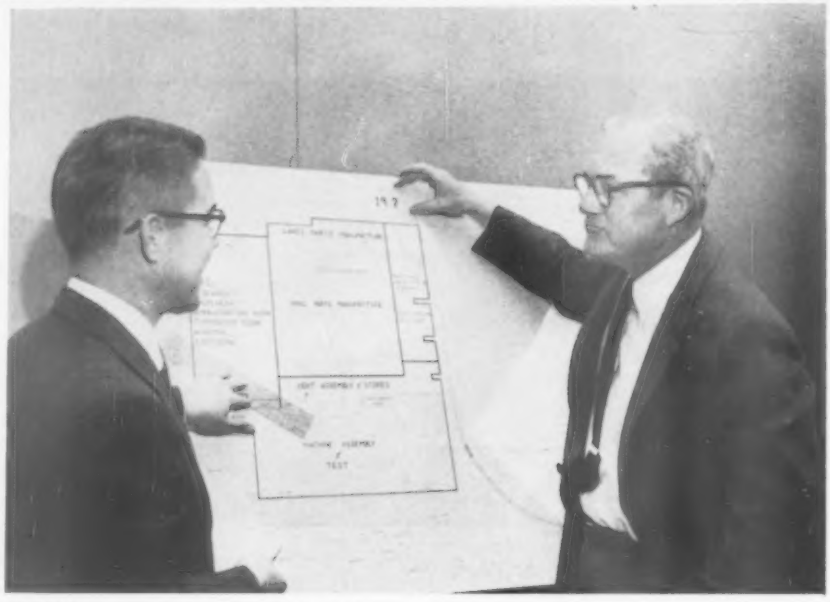
partment. Heald felt that this was more pressing than the need to restrict spending in a slow year.

Other examples of 1958 modernizations in spite of adverse business conditions are these:

1. Heald completed its program of boosting plant lighting from 50 to 100 foot-candles by replacing a mercury-vapor system with fluorescent bulbs. The company has learned that it's less expensive to replace lights than to have a man constantly changing tubes with all the attending inconveniences and production slowdowns. Side bonus: Heald now gets by with less air-conditioning effort because the new fluorescent bulbs generate far less heat than the old lamps.

2. Installation of radar watchguards at Heald Shore Park and at the company's recreation center cuts 'way down on security expenses by centralizing protection for both areas and the plant itself in the central guard area.

3. A new two-way radio system speeds materials handling. Two outside trucks (½- to 5-ton) were dropped and the men absorbed into the plant when one 2½-ton truck with two-way radio was added.



PLAN for current year fits right into the company's long-range program, says Chief Industrial Engineer Bice to Works Manager Keyes, as he explains its workings.

CHARTING EQUIPMENT AGE

Heald keeps an up-to-date record of average ages of all categories of production equipment. In a bar chart, each bar shows the current average age of each piece of equipment according to type—lathes, millers, grinders, and so on. On each bar is a line representing the ideal age of equipment in that particular category. That's the goal Heald shoots for.

Each year every bar moves up one full notch unless some equipment is replaced. As Keyes points out, "Machines as a group grow old in a hurry unless we constantly replace the older ones."

Equipment age is a workable indicator of a plant's ability to compete in both price and quality. But it isn't the sole criterion. Heald applies the MAPI formula to its machine tools, too. This aid helps to determine which machines should be finally selected for replacement—and when. The MAPI formula also is a means of comparing new machines, with new features, against the machines now in the shop—regardless of their age.

To keep informed on the state of production equipment Heald uses one other device—a maintenance record. A card shows just what has been necessary to keep each machine in shape to produce. As a machine reaches a point of high maintenance cost, it's automatically ticketed for a MAPI check. A periodic teardown and rebuild of each machine is part of the general maintenance routine. Occasionally this examination alone is enough to put a machine on the replacement list.

THREE-YEAR LOOK-AHEAD

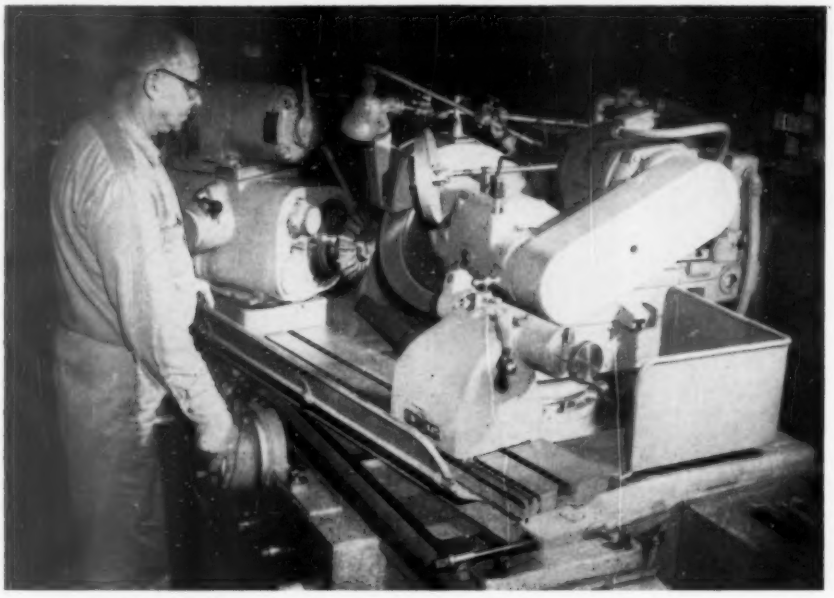
Each year Heald prepares a three-year capital expense budget as well as its regular yearly budget. As Keyes says, "We can't accomplish the short-range plan without making a long-range plan." Three years may not sound very long range, but at Heald it's the outer limit to realistic planning. When it comes to budgeting on manufacturing and maintenance, five years is too far out, three years is just right. Heald knows. It tried the five-year plan, but without success.

The company does look much further ahead than three years, although the really long-range planning (more about that later) is more difficult in terms of dollars and cents. But the three-year budget is a fairly firm schedule of capital expenditure for plant modernization. It goes to the board of directors for review. But even their review doesn't change the year-to-year basis of appropriations that are determined by the annual budget.

The three-year budget is especially useful for slotting the projects that should be undertaken but (for one reason or another) cannot be done in the year immediately ahead. Without a plan such as Heald's these projects are sometimes tabled and forgotten. With a look-ahead budget there's a place of recognition for these ideas—a place where they won't be lost.

True, the three-year budget tends to get pretty heavy in terms of money required. But many future projects can be postponed longer or cheapened when they're considered for the next-year budget. On the other hand, the cost of staying modern is high. It has to be faced and dealt with. Limiting capital budget proposals to anything less than adequate is sure to result in "rundown heels" before the passing of many years. And that's what Heald is trying to avoid.

The three-year budget carries with it a look-ahead at broad needs as well as individual pieces of equipment. A case in point is the boiler house built in 1940. At the time the demand for power was only a frac-



ACTION on plan results in new grinder, which halves grinding time, saves $5000 a year by using silicon carbide wheels, turns out doubly precise concentric diameters.

tion of what it is today, but Heald went ahead and built a new power house big enough to accommodate new equipment until mid-1957.

PLANNING FOR 19??

The big layout chart (left photo) is more than just a composite of wishes. It's a constant reference chart to which people like Assistant Industrial Engineer George Sonntag turn when grappling with problems such as inadequate sheetmetal capacity, too little weldment space, too little headroom in machine area, too little conference space, floor space, demonstration space.

Sonntag was involved in a recent analysis of sheetmetal work. (Main use of sheetmetal is for guards and protective coverings for equipment.) The company knew the sheetmetal work was no longer a repair operation at Heald. Everything seemed to point to its becoming a full-scale production operation.

"But," as Sonntag says, "we just didn't have space. We ran our analysis and proved to ourselves that we had economic justification for going ahead with new fabricating, assembly, welding, and heat-treatment equipment. But that wasn't enough to solve our problem. So we drew up a formal proposal for capital expenditure to bring the sheetmetal and weldment operations up to date by doing a new plant layout. Our proposal fitted right into the company's long-range plan."

Now when Heald goes about relocating and modernizing its sheetmetal and weldment facilities it will have already corrected a long-standing defect in the burr-and-lap department—a department that now stands in the wrong spot for greatest efficiency. "So we tried—and I think we succeeded—to put burr-and-lap in the spot they'll ultimately have anyway, thus saving ourselves an extra move."

PROGRAMING MAINTENANCE

Some parts of the present Heald plant were built as far back as 1903, with additions in 1912, 1919, 1930, 1937, 1940, and 1952. In older sections, narrow bays, low ceilings, and sawtooth roofs complicate maintenance. To simplify it, many housekeeping operations are systematized on an annual or rotating basis. Heald finds this planned program less expensive than catch-as-catch-can housekeeping.

Here are examples of Heald's approach to maintenance:

• Roof areas are divided into sections, according to their age. As each section comes out of its 20-year bond period it's watched closely. When condition warrants, the section is replaced, with replacement carefully planned ahead.

• Painting is now programed. Plant is divided into individual segments. Generally, segments are labeled and scheduled for painting every five or seven years.

• Housekeeping is important. But cleaning is more than sweeping floors. At least once each year every part of the plant, from floor to roof, must be cleaned thoroughly. This job used to be done during vacation shutdowns. But that had disadvantages, including the relatively high cost. Now this extra housecleaning job is divided into parts, done on a scheduled basis.

Heald employs outside contractors for much of its buildings and grounds maintenance, including roofing, painting, and snow removal. Even so, programing this work has three big advantages:

. . . *Levels spending.*

. . . *Makes expense easy to predict.*

. . . *Keeps plant in better shape.*

One other interesting fact about Heald's maintenance: Plant Engineer Sherman Ordway estimates that he spends only 25% of his time supervising routine maintenance, including minor emergencies. He spends the major part of his time on the big problems and the problems of the future. This alone indicates Heald management's serious attitude toward managing modernization.

UP-GRADING PEOPLE

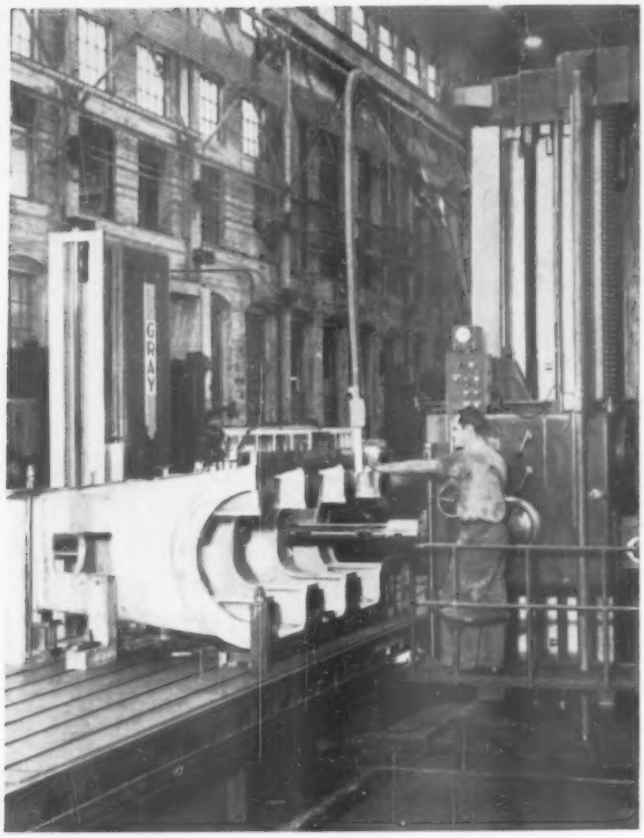
Heald President Carl Roby flatly says: "People are our most important asset." The company gives deeper meaning to President Roby's words in two ways: development of personnel for bigger and better things, and providing additional benefits for all employees.

Industrial Relations Director Matthew Stepanski supervises several continuous training programs. Each is aimed to provide the kinds and numbers of employees needed to run the plant in the years ahead. Heald trains its workers in regular fashion with opportunity to compete with others for the progressive openings that regularly occur.

The other side of personnel improvement is the company's serious attempt to provide "something for the employees" in each year's budget. The "something" takes one of several forms: a general wage increase, improvement of the pension plan, or—as in a recent year—a beach club on a pleasant lake in Worcester that's convenient to most workers' homes. Even in 1958 the employees got a cost-of-living increase they didn't expect.

MANAGED MODERNIZATION At Work

In managed modernization, customer demands set the pace for manufacturing improvements and steer you to your smartest cost-cutting moves. Here's a new slant on . . .



For new products, new machines . . .

MARKETING: Best Pacesetter

MANUFACTURING goes modern in answer to marketing facts. That's the switch modernization is taking at Worthington Corporation's Compressor and Engine Division (Buffalo). The pressure-cooker schedule fulfillment chart (facing page) and the multiple operation horizontal spindle boring mill (above) represent effort and money expended to give the customer what he wants—when he needs it.

The result from a manufacturing viewpoint? Increased production volume, faster acceleration through the break-even point, where fixed costs have their least punitive effect.

Payoff from this market-guided modernization includes such specifics as these:

- Shortened delivery lead-time and manufacturing cycle.
- Increased sales volume.
- Increased inventory turnover from three times a year to four—an exceptional figure for long lead time production. (Compressor and Engine Division equipment is generally produced in very small lots but is expensive—up to half a million dollars per unit—and requires long lead times—up to two years.)

"We used to think of our function as the servant of the sales department," says Walter E. Max, manager of manufacturing. "Now we reverse the roles so that marketing information can guide us to the modernization project with the most potential. Without this viewpoint, we might concentrate on a cost-cutting effort with not nearly the effectiveness in the over-all profit picture as an improvement in a manufacturing technique that affects quality, for instance. Or we might buy new equipment that wouldn't be able to handle the kind of product our sales department expects to sell in the next few years."

At Worthington's Buffalo plant the net effect has been to adopt what Max describes as a "can do" philosophy. Manufacturing emphasis is on meeting narrowed delivery margins for heavy equipment. And upon equipping the plant to meet ever-tightening engineering specifications. This "can do" philosophy is best represented by (1) a modernized production control system and (2) carefully selected facilities-modernization projects.

PERFORMANCE GOALS SET

The schedule fulfillment chart (above) tells division executives how well the manufacturing department is achieving its goals. But it is only the final statement and audit of a long list of carefully planned objectives and achievements. A study of the chart will quickly demonstrate that long-range planning for the manufacture of heavy equipment has its difficulties—as a performance of 73.4% for Product C in the second

SCHEDULE FULFILLMENT AUDIT

DATE SHIPPED VERSUS SCHEDULE DATE		1957 TOTAL UNITS	1958 PERCENT ACTUAL	1958 PERCENT OBJECTIVE	1958 JANUARY	1958 FEBRUARY	1958 MARCH	1958 PERCENT – 1st QUARTER	1958 APRIL	1958 MAY	1958 JUNE	1958 PERCENT – 2nd QUARTER	1958 JULY	1958 AUGUST	1958 SEPTEMBER	1958 PERCENT – 3rd QUARTER	1958 OCTOBER
PRODUCT A	On Sched. or within 1 Wk.	608	89	90	39	26	34	98.1	34	35	40	93.2	31	24	43	80.4	31
	1 to 2 Weeks Late	31	5	5	0	0	0	0	2	0	5	6.0	6	4	5	12.3	5
	2 Weeks or More Late	41	6	5	1	1	0	1.9	0	1	0	.8	0	3	6	7.3	3
	TOTALS	**680**	**100**	**100**	**40**	**27**	**34**	**100**	**36**	**36**	**45**	**100**	**37**	**31**	**54**	**100**	**39**
PRODUCT B	On Sched. or within 2 Wks.	287	90	90	11	9	14	97.1	14	11	8	94.3	11	10	19	89	17
	2 to 4 Weeks Late	16	5	5	1	0	0	2.9	0	2	0	5.7	0	1	0	2	1
	4 Weeks or More Late	14	5	5	0	0	0	0	0	0	0	0	0	1	3	9	2
	TOTALS	**317**	**100**	**100**	**12**	**9**	**14**	**100**	**14**	**13**	**8**	**100**	**11**	**12**	**22**	**100**	**20**
PRODUCT C	On Schedule	59	82	90	5	2	4	84.6	3	4	4	73.4	6	1	6	86.7	2
	Within 4 Weeks	3															
	4 Weeks or More Late	10	18	10	1	0	1	15.4	1	0	3	26.6	1	1	0	13.3	3
	TOTALS	**72**	**100**	**100**	**6**	**2**	**5**	**100**	**4**	**4**	**7**	**100**	**7**	**2**	**6**	**100**	**5**
PRODUCT D	On Schedule	70	92	95	10	10	7	100	2	7	6	100	4	8	6	100	7
	Within 4 Weeks	6															
	4 Weeks or More Late	1	8	5	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTALS	**77**	**100**	**100**	**10**	**10**	**7**	**100**	**2**	**7**	**6**	**100**	**4**	**8**	**6**	**100**	**7**
UCT	On Sched. or within 1 Wk.	608	89	90	39				34	35	40		31	24			
		31															

. . . and rigorous production controls are "musts"

for Modernizing Your Plant

quarter of 1958 reveals. (That was when a number of unprecedented engineering changes in prototype equipment temporarily disrupted schedules.) But by setting schedule performance objectives high and exercising a number of controls (see below), Worthington has improved over-all performance by more than 50% of what it was a couple of years ago. For many products, it now approaches perfection.

Other reports that precede and supplement the schedule fulfillment chart are:

- Monthly composite machine-loading chart for major machines.
- Monthly shortage report, checking status of each job and shortages.
- Weekly back-order report to control allocation of shop time to contract and stock orders.
- Monthly analysis of 10 oldest stock orders, including number of times an order is repeated on list.
- Monthly stock order report that shows status of all stock orders as open, closed, or released.
- Special reports for machine loading critical parts.

FACILITIES MADE MODERN

To supply manufacturing managers with the manpower and equipment needed to take full advantage of marketing knowledge, Worthington has a straightforward capital appropriation program based upon payback period. But Max observes that payback alone wouldn't justify purchase of some of the heavy machine tools needed. Take the Gray boring mill (photo at left). It outperforms its predecessor almost 3 to 1, can handle parts twice as large, and can rough, semi-finish, finish-bore, counter-bore, and face in a single pass. "But we wouldn't have spent the large sum it cost," says Max, "if it couldn't work to a tolerance of 0.001 on an 18-in. diameter."

An excellent example of fast dollar payback, however, is the Pangborn Rotoblast, purchased last year for cleaning castings. It cost about $18,000. It will return this sum in less than two years. But it, too, provides other advantages. Its size (20 cubic feet) permits it to handle 800-lb. castings. The displaced unit could handle only up to 100 pounds. So now Worthington is contemplating addition of a 72-cu.-ft. unit, which would handle 75% of the foundry production.

Another modernization project with hard-to-prove payoff features is the addition of 24,000 square feet of building area for stockrooms simply by roofing over the existing areaway between two buildings. Cost was a modest $100,000. The plant plans to enclose another area, utilizing an existing outdoor craneway structure for ironwork. This will add a building roughly 245 feet long by 75 feet wide for about $150,000.

MANAGED MODERNIZATION At Work

Big plant or small—doesn't matter. The customer calls the turn, makes modernization a "must" for both. This real-life plant story will tell you what to do. . .

NEW Conveyor system is called the "meat rail." It speeds furnace parts from welding to assembly.

When Product Changes Call for

PROCESS CHANGES that grew from changing customer demands. Plus "buggylugging." These two things made managed modernization of an outmoded handling system a "must" for Thatcher Furnace Company (Garwood, N.J.).

Thatcher makes furnaces. Customer preference has been swinging gradually to the warm-air type. That's what brought changes in Thatcher's manufacturing processes. And these process changes revealed a lot of costly buggylugging. What's that? It's President Carl Sahler's word for "picking up and putting down materials that you really don't need to move. That's what we were doing continually," he says, "and it was costing us plenty."

What has Thatcher done? It has met the challenge by consolidating into a compact, one-level area all the operations formerly housed in an old three-story building. Now the company has modernized processes (see photos) and streamlined plant layout. It did such a complete job of reshuffling that what had been a jungle of handling woes has become a garden of efficiency.

Why the jungle in the first place? People buying furnaces didn't decide they wanted warm air (furnaces) *en masse*. They decided one by one. Thus Thatcher's production processes changed little by little. That's what caused a gradual but steady changeover from cast-iron to sheet-metal parts. And that's what caused a gradual worsening of the plant's layout until it became a buggylugging nightmare.

Both Sahler and Manufacturing Manager Edward Tuttle had been aware that they were caught up in the industry-wide trend from cast-iron to sheet-metal parts for furnaces. And Thatcher had long banked most of its foundry fires and swung its efforts to sheet-metal work. But the old handling system —jumble though it was—still performed fair service. At least there was no cold proof that it had to go.

In mid-1957 Tuttle and his two assistants, Process Engineer Edward Terepka and Superintendent George Gray, came up with an analysis that left no doubt that Thatcher needed a new layout. The old system was costing 'way too much in handling costs, indirect labor costs, product delays, and frazzled schedules.

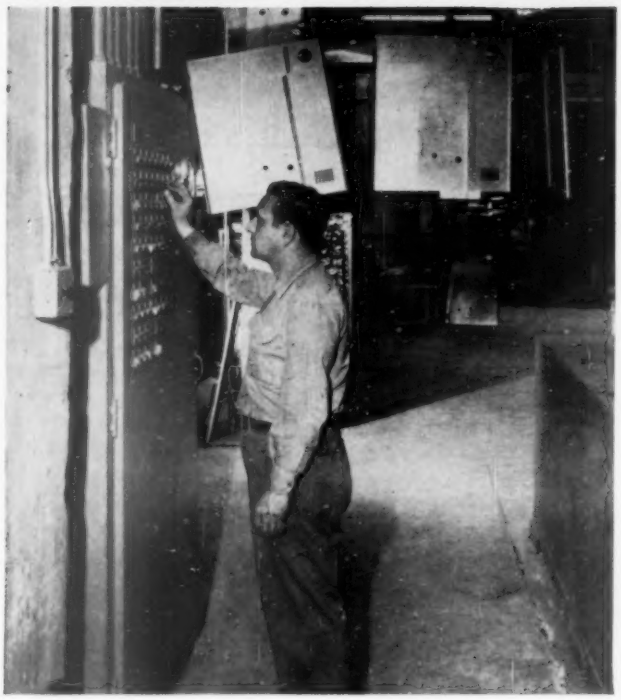
SOLVING THE PROBLEM

The big headache was a lanky (550-ft.), old (1890) three-story building that had gradually become the center of production activities. The building was being used for metal fabrication (shearing, forming, welding, and painting) as well as for final assembly.

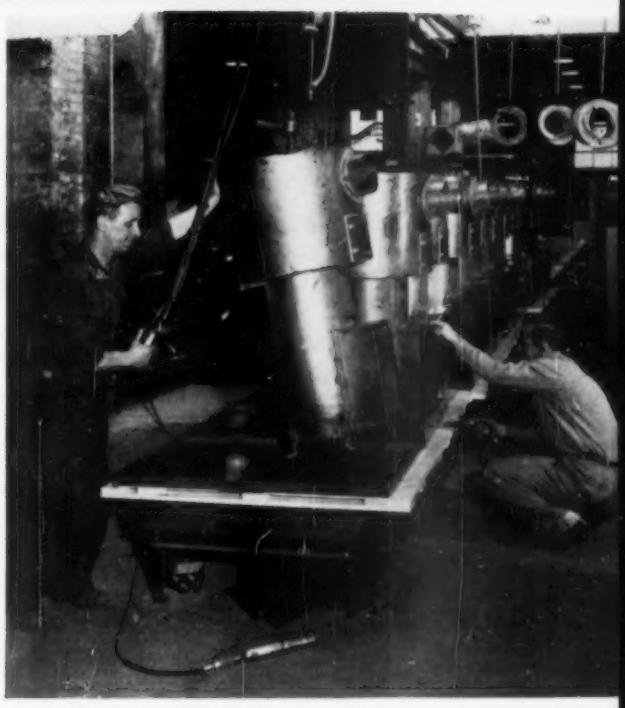
Although fabricating operations took up no more room than they did in 1950, capacity had been greatly increased. Thus, in the old building, the traffic had become heavier and heavier.

Then there was the painting area. It took up 7500 square feet, was a clumsy operation in the old building. But there were increasing demands on the painters as the proportion of sheet-metal work edged toward 90% of the total work being done at Thatcher.

All these process changes increased handling of materials and parts in the three-story building and between buildings. Raw material and sheet-metal fabrication were on one floor, heat-exchanger assembly and painting on another. Final storage and shipping areas were at still an-



NEW Painting machine scalds metal clean, pipes paint to spray guns. Pushbuttons control its operations.



NEW Assembly line enables workers to get components from overhead conveyors, install motors easily.

New Processes, Modern Handling

other spot. That meant there were long hauls by truck from one building to another, by elevator from one floor to another, then by hand cart and lift truck to final assembly, and last, by truck again to shipping or final storage.

Thatcher developed a plan to solve the problem by abandoning the three-story building and using the two buildings next to the heat-exchanger shop for the rest of the production operations. That meant compressing 44,000 square feet of area in the three-story building into 30,000 square feet all on one level. This would completely eliminate the multi-story obstacles and the need to truck exchangers all the way to the assembly area and to return the completed units to storage and shipping buildings.

PLOTTING THE RESULTS

Now the whole operation of building a home furnace and all its parts goes smoothly from the storage of raw materials through fabrication subassemblies, painting, and final assembly, and then to shipping dock or warehouse.

Thatcher has saved so much room in the new layout that it is now planning to lease the 44,000 square feet in the old building. In addition to achieving big savings in materials handling, indirect labor, and other indirect production costs, the company has doubled its painting capacity in 40% less space, boosted fabricating capacity, and driven the buggyluggers out of the production temple for a long time to come—if not forever.

TIMING THE ACTION

Step by step, here's how the move was carried out:

January, 1958—The casting, machining, and testing area that had occupied 15,000 square feet of building CD (the building slated for painting and assembly) was moved into an adjacent corner of a warehouse. The vacated area was then cleaned up in preparation for preliminary work on the new conveyorized finishing system.

February—Building G, then a warehouse, was emptied and prepared for eventual movement of welders, shears, presses, and other equipment from the three-story building. Neighboring buildings were used as warehouses.

March and April—Building CD was repaired and made ready to receive the new equipment.

May—Electricians moved into the newly refurbished buildings and wired up for installation of the heavy production equipment.

June—The specially built painting conveyor line, along with the metal priming equipment, spray booths, and drying ovens, was installed in Building C. The assembly conveyor line went into Building D and the "meat rail" parts conveyor into Building F (the heat-exchanger shop). The company also began moving equipment into Building G during this month and then finished the final assembly conveyor line construction and installation.

July—The shears, presses, and other fabricating and assembly equipment were all moved during the two-week vacation shutdown. Reports Tuttle: "The excellent cooperation of everyone involved made it possible to complete the job on July 19 without any unscheduled interruption in production."

As pressures from markets and costs build up, you'll find more reasons to modernize—and seek more ways to do the job. Here, from companies that have facelifted their facilities, are . . .

MANAGED MODERNIZATION At Work

5 Ways to Modernize Your Plant

MODERNIZATION wears many faces. So there's no need to stake your whole modernization achievement on just a single project. You can get a good variety of ideas for facelifting your own plant from the story on these three pages of what five plants did to modernize their manufacturing facilities. Take their achievements one by one:

1. Saved 50% in construction costs by adding a new facility adjacent to the old plant.

2. Tripled production per square foot by putting a single roof over three separate buildings.

3. Saved about $1-million by reusing existing electrical conductors in modernizing the electrical system.

4. Cut the power bill 25% per year with a new distribution system.

5. Added 446,000 square feet of production space by converting an assembly plant to heavy processing.

1. Combine new with old

That new building in the foreground (photo above) is brother to the six-story, 50-year-old plant in the rear. By abutting this modern facility on the old instead of erecting it elsewhere, The Fafnir Bearing Company (New Britain, Conn.) saved 50% in construction costs. How did it do this? The company first renovated the old building so it could store there the materials for 100 presses that were destined for the new building. This not only cut materials handling. It also meant a 55% reduction in space needed for the 100-press operation—from 75,000 to 33,000 square feet.

General Works Manager F. S. Atwater sees it this way:

An old building, properly fitted, will store steel stock and pressings as well as a new one. In an isolated plant you'll need space for allied services such as die manufacture and maintenance. If you're connected to an existing installation, you can use centralized services. Savings show up in your fixed costs and in your day-to-day costs.

2. Consolidate operations

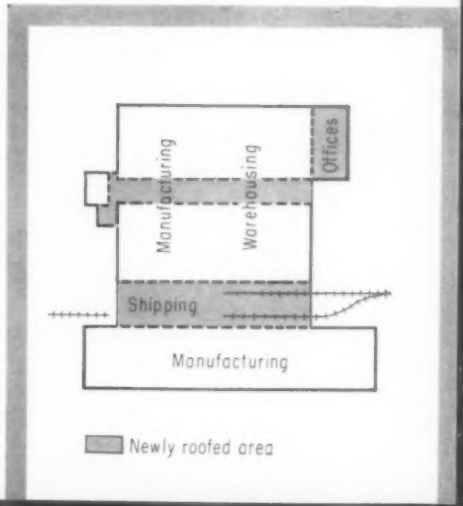
Put 'em under one roof. That's what Crown Cork & Seal Company (Baltimore) did. Shaded areas of sketch (right) shows how roof now joins three buildings that house manufacturing, warehousing, shipping. Result: One square foot of space now produces what used to require three square feet.

Crown has already spent nearly $4-million in a three-phase modernization program:

1. Moved from old multi-story buildings to three existing one-story plants (sketch). Cost (along with new equipment): $1-million.

2. Consolidated new area with a single roof, added two-story office, thus boosted production and quality with newest manufacturing and handling techniques. New space: 300,000 square feet; old space, 1,000,000. Cost: $2.8-million.

3. To be completed in 1960. It involves relocation and relayout of another processing line.



3. Renew with reclaimed copper

The brand-new lighting panels being wired into place in this photo (right) are connected with nearly $1-million-worth of re-used existing primary cables and secondary bus duct. This installation has helped cut costs on a $2-million electrical modernization at Chrysler Corporation's Mt. Elliot Plymouth plant in Detroit. The job is being done without causing interference to production, despite the fact that 228 distribution panels are being replaced. And not one piece of electrical equipment will interfere with present or proposed flow of conveyor or assembly lines.

Here's the background:

The plant, main Plymouth assembly, has no heavy automated machine loads but needs plenty of power (12,000 kva.). It's a 1,250,000-sq.-ft. plant, runs nearly ½ mile in depth. The original part was built in 1927—some of it even earlier.

After over 30 years and some 41 major additions it is today one of the country's larger assembly plants. It was one of the earliest auto plants to use 440-volt distribution via open-wire distribution. The plant is fed from three 6000-kva., 4800-volt feeders from a Detroit Edison substation, which feeds three adjacent Chrysler plants, that purchase power through one meter.

PROBLEMS AND AIMS

When Plymouth began a $17-million modernization program two years ago, management recognized that upgrading the plant's power distribution system was just as important as improvements in tooling, building layout, or materials handling. The new electrical system was designed by Albert Kahn Associates under the supervision of H. H. Hunt, plant electrical engineer at Plymouth.

Underlying the new design were these problems: Primary voltage was predetermined by the 4800-volt rating of the four-plant main substation. Primary feeder capacity was adequate, but primary subs were in the wrong place. secondary feeders were inflexible and inadequate and had high voltage drop, and column-mounted distribution panels were high in the air, inconvenient for switching lighting or circuits.

Management laid down the following objectives: No electrical distribution equipment could be mounted on or under the floor—nothing was to be in the way of present or future assembly line flow. Substations had to go on the roof. Primary cables had to be carried across the roof—no buried conduit. Distribution panels had to be kept inside supporting columns, lighting transformers mounted where no conveyor line would reach them. Minimum interference with production could be tolerated during the change-over.

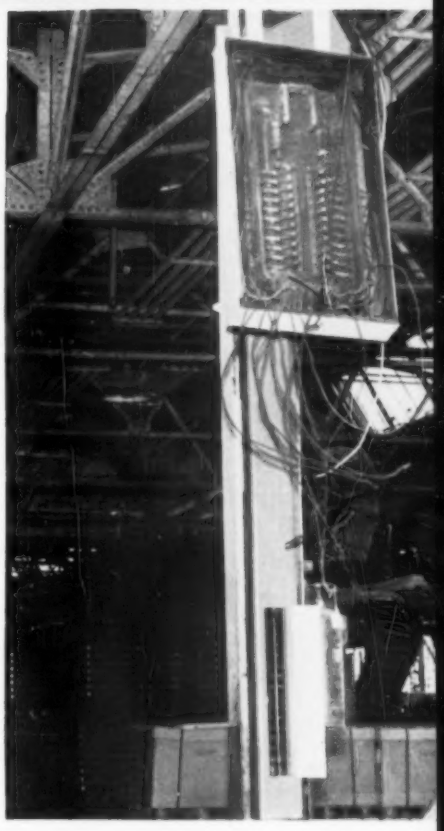
To these over-all objectives were added several specifics as follows: Provide for a 10- to 15-watt-per-square-foot load in assembly areas, double that wattage in painting or central service areas. Load should include about 40 foot-candles average illumination with 60 to 100 foot-candles in special assembly, painting, and inspection areas. Any existing distribution equipment that could be economically adapted into the new system was to be re-used. From 20 to 25% extra feeder and breaker capacity was to be provided.

ACTION ON PROBLEMS

First, four new secondary substations were laid out in the center of four areas of the plant. A fifth was placed in the same building as the new primary substation. "Auto assembly loads are too unpredictable," say Plymouth engineers, "to guess where future load centers might be. Best thing is to assume uniform loading over the entire floor area." One exception—the painting area, where 4800 horsepower of big ventilating fans and pumps will probably stay put. So the main substation and one unit substation were located above this heavy load center. Another exception—the body shop area, where two unit substations serve the heavy welding load.

The system is radial. Plymouth men believe they get the reliability they need by having spare transformer and breaker capacity ready for switchover in case of failure.

Plymouth got every penny's worth of value out of some 8000 feet of 400-amp. bus duct that had been installed in 1944, but was mounted at right angles to where it was needed. All of it was taken down, returned to the manufacturer for complete rebuilding and inspection (copper bus doesn't wear out). Defective or broken parts were replaced. Then the returned duct was reinstalled in the new system, where load was within its rating. Also most of the existing incoming primary cable was in good shape and is now being re-used after careful inspection.



TOUGHEST OF ALL

Changing over lighting panels without interfering with production was a toughie. About 75% of the old panels were old open-switch-and-fuse type mounted at an inconvenient 8-ft. height to protect them from fork trucks. This meant a ladder every time a fuse had to be replaced. Plymouth's experience with the new narrow breaker-switch panels that fit inside the web of the I-beam columns has been good. So about 175 old panels are being changed to the new without interfering with production. In addition, a good many of the panels will include more circuits—many with 32.

Plymouth made a neat trick of it. A new junction box is mounted at top of the column below the old box (photo). This provides room for more connections and the double set of connections needed during the

Begins on page 54

switchover. The old panel with conduit connecting to the old junction box is unbolted, swung out from the column, and secured in mid-air while still connected. The new panel and conduit are next mounted inside the column. The new conduit is connected into the old or new junction box, whichever is more available. Then circuits are cut over to the new panel one at a time. Those that can be interrupted without penalty to production are done on the spot. Rest are done when production is down on a well-planned schedule. As each panel changeover is completed the old panel and conduit are disconnected and scrapped.

4. Up power factor

Consolidation and improvement of electrical services at Marquardt Aircraft Company (Van Nuys, Calif.) last year boosted power factor sufficiently to earn a 25% savings yearly. The job cost the company $200,000 to complete. It featured installation of a 4500-kva. master substation (photo at left), from which power is distributed to unit substations throughout the plant.

By consolidating separate supply meters Marquardt obtains an attractive discount rate. Fluorescent fixtures, having a unity power factor, have played an important part in this achievement, according to Plant Engineer W. M. Estelle. That's because lighting is a major element of the plant's electrical load—100 foot-candles in the shop, 150 in engineering offices, and 220 in the engine test area.

Modernization at Marquardt also includes time clocks that control lighting fixtures. Clocks cut intensity down at the end of the shift to a lower level that's suitable for custodial workers. One hour later the lighting is automatically dimmed to the minimum required for security guards.

Unit substations are spaced for short runs of 4-wire Y 277/480 lines to operating equipment. The new system uses circuit breakers throughout instead of fusing. This, too, lowers operating costs in addition to offering better protection to equipment and people.

F. E. Hamlin, assistant plant engineer, cites these other advantages of the modernized system:

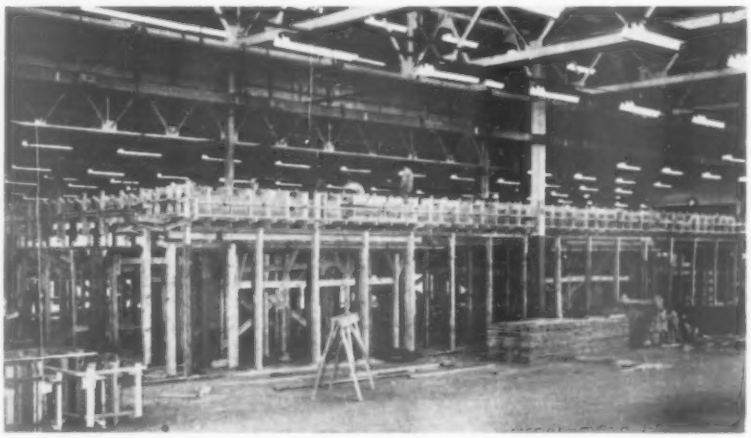
- Simplified installation of new operating equipment.
- Easy addition of loads. Loads can be shifted if necessary.
- Space savings. New distribution panels require only half as much space as the old ones.
- Better voltage regulation. This improves over-all operation and lengthens the life of fluctuation-sensitive equipment.

An added value: When Marquardt opened its new 14,000-sq.-ft. cafeteria last summer, it posed no power problem for the plant engineers. Distribution centers were close at hand and plenty of power was available whenever needed.

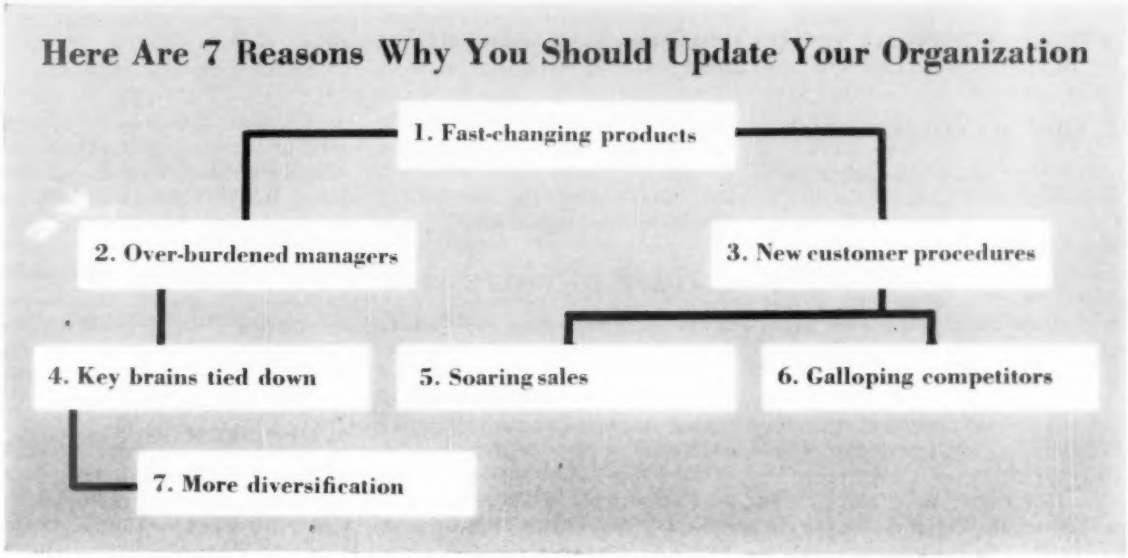
5. Convert from assembly to process

This is a picture (right) of an auto assembly plant being converted to a plant for processing electrical cable. Workmen are pouring concrete for foundations and a mezzanine for heavy equipment.

The Okonite Company (North Brunswick, N. J.) chose this method of acquiring up-to-date facilities mainly because it was considerably quicker than starting from scratch. Interior foundation work progressed faster, too, because weather couldn't interfere. And, of course, Okonite got more land, access roadways, and existing services included in the price of the old shell than if it had purchased or completed each of these assets separately.



To convert the plant from its original purposes to a manufacturing and processing plant required pouring 2800 cubic yards of concrete and 420 extra tons of reinforcing steel, according to the contractors (Wigton-Abbott Corporation, Plainfield, N. J.). But construction proceeded so rapidly that Okonite concluded its expenditure of $4,205,000 for the 420,000-sq.-ft. plant on a 160-acre site had been an excellent way to get its modernization project underway quickly.


Here Are 7 Reasons Why You Should Update Your Organization
1. Fast-changing products
2. Over-burdened managers
3. New customer procedures
4. Key brains tied down
5. Soaring sales
6. Galloping competitors
7. More diversification

Plant and equipment all updated? That's not enough. Takes modernized organization, too. These case histories will give you . . .

MANAGED MODERNIZATION At Work

7 Tips on Updating Management

ODDS ARE 100 TO 1 you'll have to reshuffle your management organization in the near future. Fact is, a change may be long overdue.

Why a change now—or soon? Any one of the seven reasons above. How can you make the change? Take a look (below) at how seven companies faced up to pressing needs for reorganization. And how each one acted on its own problem.

1. GET SET FOR CHANGES

To keep competitive in the fast-moving semiconductor field, management must be fast on its feet. Quick decisions are "musts" for new developments. Technology can wipe out a carefully devised production system with a single discovery.

That's the climate at Texas Instruments, Inc., Semiconductor Components Division(Dallas). And the reason for the division's recent reorganization. Net effect: decentralization and flexibility.

Six new departments—Texas Instruments has created six vertical new-product departments. Each is responsible for a group of products —silicon products, germanium products, diodes and rectifiers, and the like. All six fall under the manager of operations. Each has its own functions: engineering, planning for product marketing, production, production planning, and related activities. Putting production managers and product engineering under each department pulls together specialists for particular products. Each department is headed by a manager. The department managers work within the framework of a plan that's revised each year by top management.

These vertical departments are serviced by eight staff departments: industrial engineering, quality assurance, mechanization, personnel, division services (plant engineering and maintenance), marketing, development, and control.

This decentralized operational scheme didn't develop overnight. In 1954 manufacturing was a separate department, not tied in directly with any other. Only the functions of production, production planning control, purchasing, test, and maintenance were under the control of manufacturing.

Then in 1957 manufacturing branched out. Two decentralized design and production departments (for resistors and panel instruments) were grouped with quality control and staff manufacturing departments under an operations manager. The design engineering function in each of the two production departments was in addition to a central engineering staff. Today's lineup developed because the "intermediate" decentralization scheme worked so well.

Increased mechanization, tough competition, rapid changes in product are the prospects for the new set-up. So far, it is doing the job.

Turn the page

2. EASE MANAGERS' LOADS

One year ago the annual production of the Bettendorf Works of J. I. Case Company was $15-million. Now it's twice that. Reason: better, fast-moving management all up and down the line. And organization that makes the manager's job manageable in the face of growing production problems.

Some problems, inherent in the plant and the operation, call for better-than-average organization to keep the works on an even keel.

. . . *It's a big, long plant*—1.5-million square feet of floor space in all, and 1¼ miles long. Length creates special problems in communication, supervision, organization. The millwright foreman once handled the electrical crew. But he couldn't do an effective job because of plant size and shape. An electrical foreman was the answer.

. . . *It's a giant job shop*. The products look as if they'd fit into a line layout. But that's deceptive. There's a vast amount of custom work. Eight production lines are now reduced to two. The two remaining lines are for groups of similar equipment. All other production is built in a process-type layout.

The real key to Bettendorf's new efficiency is the new organization at the top. Five of the eight top men are new to their jobs. Only one came from outside.

The plant superintendent's main job is to plan production. His problem: too many other irons to keep hot. So the new title "manufacturing engineer" was created—and a manager was named—to be responsible for the equipment group.

The manufacturing engineer handles plant maintenance, toolroom, plant engineering, and cost reduction. He reports directly to the works manager, as does the plant superintendent. And further to relieve the plant superintendent of detail, the company created the new office of division superintendent. The division superintendent reports to the plant superintendent, takes care of materials handling, shipping, receiving, and export and repair parts shipping. Some positions, such as master mechanic, have been eliminated—no longer needed under the new set-up. The reorganization around the plant superintendent's job has reduced the number of people reporting to him from 12 to 5.

3. ADAPT TO WHAT'S NEW

The new Air Force approach to procurement involves a wider dimension in plant-management responsibility. Already it has forced Boeing Aircraft Company (Seattle) to reorganize parts of its operation.

Old way—Aircraft companies were responsible to the government for airframes. Engine builders were separately responsible.

New way—The prime contractor is responsible for the entire unit, whatever it is. Reason is that weapons systems and engineering organizations are becoming more complex. Better management control of the whole operation is necessary to the design and production of a missile or a comprehensive weapons system.

Thus far Boeing's engineering organization is most affected. Formerly engineers were assigned work on a particular design project, such as a specific missile or aircraft. Now they are divided into groups according to their skills, handle particular types of design on all types of projects.

Implications for the management man in a plant with Air Force contracts depend on whether his company is prime contractor or a subcontractor. If it's prime he'll need liaison control men to keep an eye on subcontractor production and quality. If it's sub, he'll need men who can work well with liaison guys from the prime contractor's shop.

4. FREE YOUR KEY BRAINS

More centralization—that's right, centralization—is the program at Beckman Instruments, Inc. Until recently the company's divisions operated as autonomous producers. Key reason for conversion to centralization: to conserve the time and talents of one of the company's biggest assets, Dr. A. O. Beckman. The plan: Develop a strong central staff, leave Dr. Beckman free to do creative work.

So far manufacturing operations are the most affected by the appointment of a director of manufacturing, with top responsibility for all divisions. His job: Make maximum use of production facilities, eliminate duplication.

Sales and general management have been beefed up, too. Idea is to improve over-all planning and control, avoid competitive bidding on the same job.

5. GET SET FOR GROWTH

Most pleasant reason we know of for management reorganization is that of Hewlett-Packard Company (Palo Alto, Calif.). Since 1950 annual gross sales have climbed by a whopping 40% per year. So the company has changed its organization to meet this growth, plans for more.

Results so far are exceptional. They span manufacturing, morale, and engineering:

. . . *Better technical control* of complex products (instruments), more precision, better quality.

. . . *Reduction in total manufacturing cycle time*. Deliveries are better, inventories are held down, materials handling costs are down. Quality control is eased by quicker feedback of information.

. . . *Better over-all workers' view* of the manufacturing operation.

. . . *Clear responsibility* for production and quality of specific instruments. It's tied to specific workers and supervisors.

. . . *Smooth transition* from research to production.

. . . *Worker enthusiasm*, stirred by the "small company" feeling the new organization aids.

New organization is a combination of product-centered and process-centered operations. Three main product divisions manufacture voltmeters and small oscillators, large oscillators and power supplies, counters and oscilloscopes. Each division includes two or three "product centers" (manufacturing lines) for a total of eight. Each manufacturing division has complete responsibility for the manufacturing function, including fabrication, assembly, wiring, and testing. Each product center is autonomous and has com-

plete responsibility for the full manufacturing operation.

Three other divisions continue to operate on a process basis: Heavy fabrication, printed circuits, and shipping. But these have been modified to use the product-centered approach wherever possible. For example, the punchpress department now paints some parts before sending them direct to assembly.

R&D problem—Hewlett-Packard with almost 1700 employees is not a small company today. Research and design group numbers about 150. This size has advantages, permits greater specialization. But the smooth transition from R&D to production was a problem. R&D men tended to lose contact with the realities of manufacturing economy. And three distinct steps were required to get a new product on the manufacturing floor—R&D to manufacturing engineering to production.

Solution to the R&D-to-production riddle came in three steps. First, R&D has been split into divisions to match the manufacturing operation. Under the new set-up R&D is product-centered, too. Within each R&D division are several groups. They tend to specialize in specific products but trade back and forth to meet special design needs.

Second, each R&D division has appointed a manufacturing liaison engineer to work with production on debugging problems of designs already released and in production.

Third—and most important—one or two product engineers have been assigned to each R&D group. These men interpret the needs of manufacturing to the design men. They influence instrument development in its early stages, work for standardization and simplicity in fabrication and assembly. One simple example close to the hearts of operating men: They prevent specification of seven screw sizes on the same piece when one size will do as well. They also keep the assembler sane and drill taps at a minimum.

Reorganization decisions were made at all levels of management. Basic decision to shift to the product-centered system was a top management move. Foremen, superintendents, and all levels were called in to work out details. And all management levels made a big effort to make the method work.

6. MATCH COMPETITORS

Think about competition, and you're sure to come upon the most sensational in the land—the automobile industry. And the member of the big three that has had the toughest upstream paddle is Chrysler Corporation. Chysler met—and is meeting—the challenge with massive organization. And Chrysler's size—100,000 men—doesn't alter the principles of the management changes effected. Your plant can benefit from the same kind of thinking—organization to meet competition—whether your payroll boasts 100 or 1-million.

Organization changes—In 1950 Chrysler's management chart was straight-line. Objective was to develop this into a modern line-and-staff organization. Starting in 1954, scattered stamping, forging, and subassembly operations were taken from the car divisions, assigned to a new corporate basic manufacturing group headed by a vice president. In April 1958 car assembly was added to the responsibilities of this group. Plant managers in each of the six vehicle-making units report through a "group executive—car assembly," bypassing the car division general manager. This "functional decentralization" set-up permits the corporation to take full advantage of the engineering interchangeability in its line of cars.

Physical changes—Next step was to make the physical changes permitted by the organizational shuffle. Program was already set, based on a 5-year program of facility planning. Historically, Chrysler expects 20% of the car market. Within this share Plymouth accounts for 50%, Dodge 25%. The remaining 25% is divided among Chrysler, DeSoto, and Imperial. Even in a normal automobile year the volumes of the Chrysler and DeSoto divisions are each too small to permit more than marginal profits with separate assembly facilities.

Also, Imperial cars, built in the Chrysler plant, proved to be a production thorn. The problems of quality control and accessory installation that arose from trying to build a high-priced, customized automobile on a mass-production assembly line were almost insurmountable.

The solution was made possible by the management changes already in effect. Imperial has been moved into a grandly renovated part of the DeSoto plant. Rest of the plant is shut down. Large DeSotos are assembled on the Chrysler line, which has plenty of available capacity. The two cars have many interchangeable parts. Transfer was made in time for the 1959 model run with no interruption in production.

7. FREE YOUR SPECIALISTS

New "unit shop" teams at Pitney-Bowes, Inc. (Satmford, Conn.), run their own show. Heading each team is a superintendent-manager, who has a full manufacturing team to rely on, including staff representatives for production control, quality control, time study, and methods. He conducts his own unit as a separate entity within the policies of the division. Two unit-shop teams are already operating. One handles five related assembly operations. The other does specialized manufacturing of powered-metal products. Two more unit teams are in the planning stage—to produce precision gears and to specialize in assembly of one high-volume product.

Staff manufacturing engineers once were able to develop a high level of special skill because they could concentrate on one kind of operation. But with increasing diversification of company business, engineers tended to be spread over many product lines, had less chance to specialize. The unit-shop system lets staff men concentrate on the work of their own unit.

Diversification also has meant increase in size. The company's main plant was recently increased in size by 40%. Unit shop organization locates staff specialists near actual manufacturing operations, lends intimacy with floor problems.

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Six Forms Fit a PM Program to Any Plant

1

The Quaker Oats Company
UNIT RECORD CARD

UNIT NO. 172 MACHINE Blower Elevator A-Root Inspection Period: March July Nov.

DATE	JOB NO.	DESCRIPTION	MATERIAL	LABOR	RUNNING TOTAL
2/1/58	17850	Sheared Pin BD		6 72	6 72
3/8/58	18418	Replace Bearings & Balance Blower	23 00	32 03	61 75

2

The Quaker Oats Company
MOTOR TEST DATA

H.P. 1½ TYPE K FRAME 182 R.P.M. 1720 PHASE 3 CYCLES 60 VOLTS 220/440
SERIAL NO. NH 2723 OPEN TE TEFC DRIP PROOF CLASS II GROUP G FULL LOAD AMPS 4.52/2.26
MANUFACTURER G-E GEAR STD BALL BRGS SLEEVE BRGS BASE NO BASE

DATE	MEGGER	AIR GAP	END PLAY	DRIVE END BEARING	TAIL END BEARING	LOAD AMPERES AT TIME OF TEST	CHECKED BY	REMARKS
3/14/56	0.4	—	—	OK	OK	4.3	WAS	
3/5/57	0.4	—	—	OK	OK	4.3	CCC	Remove motor, clean, and retest.
3/6/58	0.3	—	—	OK	OK	4.3	GCQ	

3

The Quaker Oats Company INSPECTION DATE RECORD

Unit No. 172 Location Elevator A Fl. Roof
Inspection Period March Mach. Blower

Inspected	Inspected
	MAR 1
	MAR 5
	MAR 6

4

The Quaker Oats Company — INSPECTION ORDER

INSPECTION OF UNIT 172 - Blower
LOCATION Elevator A
DATE INSPECTED
DEPT. MANAGER INSPECTOR Fl. Roof

MAR 1 1958

5

The Quaker Oats Company DATE 3/8/58
DAILY RUNNING INSPECTION
DEPT. 11 OPERATOR WS
UNIT No. 217 15oz. Case Conveyer Fl. 1

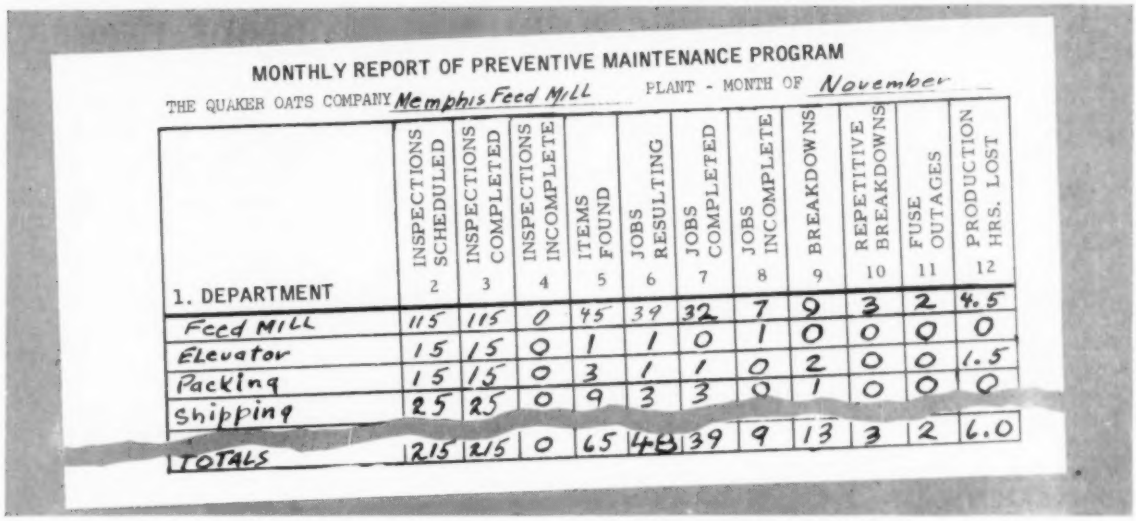
REMARKS: Clutch occasionally stick

6

The Quaker Oats Company BREAKDOWN REPORT DATE 4/14/58

UNIT NO. 204 DEPT. 11 FL. 1
DESCRIPTION: Drive chain broke on 12-oz. Labeler

LAST INSPECTION 4/3/58
HOURS LOST 1 PRODUCTION LOST 350 cases
REMARKS:



MONTHLY REPORT OF PREVENTIVE MAINTENANCE PROGRAM

THE QUAKER OATS COMPANY Memphis Feed Mill PLANT - MONTH OF November

1. DEPARTMENT	INSPECTIONS SCHEDULED 2	INSPECTIONS COMPLETED 3	INSPECTIONS INCOMPLETE 4	ITEMS FOUND 5	JOBS RESULTING 6	JOBS COMPLETED 7	JOBS INCOMPLETE 8	BREAKDOWNS 9	REPETITIVE BREAKDOWNS 10	FUSE OUTAGES 11	PRODUCTION HRS. LOST 12
Feed Mill	115	115	0	45	39	32	7	9	3	2	4.5
Elevator	15	15	0	1	1	0	1	0	0	0	0
Packing	15	15	0	3	1	1	0	2	0	0	1.5
Shipping	25	25	0	9	3	3	0	1	0	0	0
TOTALS	215	215	0	65	48	39	9	13	3	2	6.0

KEY CONTROL IS MONTHLY PM REPORT. IT INSURES PERIODIC INSPECTIONS, SWIFT REPAIRS.

This PM* Program Fits Anywhere

*** Preventive Maintenance, that is. It's a package plan—suited for almost any kind and size of plant (probably yours, too). Cost is low, payoff high.**

TODAY we've got a standard preventive maintenance (PM) program that will fit the needs of any of our 28 plants. That's how flexible—and universally applicable—it is. The payoff is really substantial.

What kind of plants are these? They're Quaker Oats plants. They make about 200 varieties of food, feed, and pet food.

How big are the maintenance forces in these plants? From 3 to 130 craftsmen is the range.

How well does our PM program fit? The only modification needed from plant to plant is the extent to which PM forms (above and on the facing page) are used. Hence some range in clerical requirements.

By KENNETH H. McBRADY
Supervisor of Preventive Maintenance Engineering Department
The Quaker Oats Company, Chicago

We had to invent our own program because we couldn't find a suitable ready-made program when top corporate management asked us for one. Our top management had long been maintenance-conscious. Good reason, too. Because our annual maintenance costs have totaled over $3-million for several years. And because nearly 10% of our work force is on maintenance work. This top-management attitude, by the way, gave us a head start on our program: We didn't have to sell PM upstairs, as some plant operating managers have to do.

GAINS ADDED UP

Before this package program, individual Quaker plants were practicing PM in some form or other. But none on a fully organized or plant-wide basis. Our earlier limited experience promised to multiply the benefits then already evident if we swung into a full-fledged program. So top management issued marching orders. After four years of effort in installing the package program in plant after plant we can now point to many benefits. The most significant are these two:

1. The ratio of dollars of maintenance cost to total plant replacement cost is gradually improving. And this despite the growth in company assets and a more complex maintenance problem caused by wide adoption of more intricate machinery with pneumatic, hydraulic, electrical, and electronic controls.

2. The ratio of repair costs to units of production has improved. True, our maintenance costs are increasing with mechanization, but at a decreasing ratio.

Turn the page

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Begins on page 60

"Repair cost figures have improved as our program

Some people want specific dollars-and-cents savings figures. Why, in face of the two facts above, we don't know. Is there any better way to put a dollar value on savings? But we can point to some specific benefits that are bringing such savings:

. . . *We note a gradual decrease in repetitive repairs.*

. . . *Our program has made everybody cost-conscious*—including operating and maintenance people.

. . . *Repair cost figures have shown improvement* as the program has swung into effect in each plant. This is especially true in plants that were able to do an all-out job in one blow rather than install the program piecemeal by departments.

What about the cost of PM itself? Clerical cost is the only extra. It runs from four hours a month in small plants (six maintenance people) to a full-time clerk in large plants (over 100 maintenance people).

OBJECTIVES SET UP

As soon as top management said "Go," the Quaker engineering department began searching for an existing PM program that it could adopt in entirety. For almost three years we investigated highly touted programs right at the scene, found none that would exactly suit our needs because of variations in the size of Quaker plants. In fact, many companies claiming a successful PM set-up had only segments of all the essential features, and often did not realize their programs were far from complete. A few large companies had excellent programs using mechanized tabulating equipment, which we could not consider.

During this time we tried out different systems for obtaining maintenance costs in small parts of some plants. Purpose was to find out what our problems were, how to solve them. Our observations of the strong and weak points of other programs were invaluable in formulating a PM program of our own. We arrived at five basic objectives:

1. All equipment must be regularly inspected if needed repairs are to be found. This calls for a periodic inspection of production machinery, utility facilities, and buildings to uncover needs before a breakdown or production outage.

2. Awareness of needed repairs isn't enough to complete them. The maintenance department must be informed promptly of such needs through written authorization (job sheets, work orders, etc.).

3. Maintenance department must plan and complete its work promptly —in accordance with the best maintenance practices at minimum cost.

4. Completed work must be inspected by production and maintenance management for quality and completeness of workmanship.

5. Maintenance histories of all plant equipment must be developed and reviewed periodically to reveal where corrective measures or possible readjustments of inspection schedules are needed.

You may think these truths are so self-evident that it's a waste of time to mention them. Our studies would dispute that. Many of the outside plant programs were limping along without one or more of these concepts, and losing out thereby on major benefits.

POLICIES ESTABLISHED

Next step was to establish a framework of operating policies within which the PM program would have to work. These policies were gradually evolved in a tentative program started in one of our larger plants in March 1954. Since then they have been successfully applied in 27 more plants. We foresee no basic revisions.

One of these policies already existed—that each operating department manager is responsible for his department. This includes physical equipment and facilities, as well as matters of production, cost, and people. Maintenance makes no repairs (or alterations or new constructions) without the okay of the operating department manager.

If there were no top-management PM policy, such a local policy could retard a PM program. Anyone not sold on PM could delay PM activities. But this is no problem at Quaker. PM is now a way of life at Quaker, with top-management backing. This fact has given needed support to these other important PM operating policies:

1. Inspections by operators—All inspections other than electrical equipment or those requiring special skills or talents found only in the maintenance department are made by the operating department manager or operating people designated by him. If the maintenance department is to perform the inspection, the production manager must authorize it and satisfy himself it was properly performed.

The plan is working well. Production machine operators are taking greater interest in the condition of their equipment. So it follows that they also take better care of it. Often equipment can be inspected during regular hours while in operation—packaging machines, milling separators, etc.—instead of requiring overtime inspection by a maintenance man. The plain fact is that an operator is on the alert, watching all the time, when he's responsible.

Obviously, this policy permits better utilization of maintenance skills and minimizes maintenance man-hour requirements. It's hard to say how much. In one plant with six maintenance men, inspection strictly by maintenance was broadened to include operating personnel —thus freeing one maintenance man for other duties. It's like taking care of your own car—you call in the experts only when needed.

2. All-inclusive inspection—Rule is to inspect every item in the plant —buildings, facilities, equipment— at least one a year. No exceptions. Some companies boast of a good PM program, but inspect only key equipment, skipping most of its plant equipment. We don't consider this adequate PM.

3. Minimum monthly inspection frequency. Equipment that requires periodic attention more than once a month is not included in the inspection program. Inspections and routine maintenance required oftener than once a month are considered operational problems.

4. PM priority. Other than breakdowns, PM repair jobs get priority

has swung into effect in each of our plants"

in the scheduling of maintenance workloads over new and replacement work. Inspections are expected to be completed during the month of their assignment, or reasons must be given for non-completion.

5. PM clerk in every plant. This arrangement answers a common objection by maintenance executives to a PM program. The clerk may be part-time or full-time, depending on the paperwork load. The executive is not saddled with it.

6. PM integrated with regular maintenance work-order system. Once the special PM routine of inspections has uncovered a need for a repair, the regular work-order system assumes the burden of getting the job done within set priorities.

7. No change in organization. A prime objective has been to install the program without adding people or revising existing maintenance set-ups. Even in clerical help we have made every effort to utilize existing personnel, such as an engineering clerk, an office girl, or a storeroom clerk, when only part-time help is needed.

Every plant normally has a mechanical department manager in charge of maintenance and plant engineering. He may directly supervise only a few craftsmen, or he may head a force of over 100 craftsmen through various foremen. In each case he reports to the plant manager. A chief engineer at the Chicago office heads up the central engineering department and acts in an advisory and control capacity over all mechanical managers.

On the chief engineer's staff is the PM supervisor (the author of this article) who acts as special adviser to all plants on PM problems. Among other things he formulates maintenance procedures, assists in problems for improvement of maintenance characteristics of equipment, and conducts tests on new maintenance materials. The local mechanical manager, however, is always responsible for the administration of the PM program and its effectiveness.

Since 1947 Quaker has had a central shop in Oregon, Ill., for building and overhauling machines of its own design, storing parts and surplus, and lending mechanics to plants for special machine maintenance and installation work. This relieves the local plants of maintenance problems that require special backgrounds and skills.

PROCEDURES DEVELOPED

Operating policies always work better when they're formalized. This means paperwork. But the tail of paperwork doesn't wag the dog of manpower effectiveness in Quaker's PM program. We don't use any forms that aren't useful. And we try to keep them simple.

Yet we need six basic forms. They are shown on page 60. All these forms are handled by the PM clerk in each plant. Not included are those forms used for regular maintenance work. There's no need to illustrate them—it's enough to identify them by function. Almost every plant has a work-order system equivalent to them: The job sheet (work order), employee's daily time report (job distribution for each worker), time sheet (for labor cost summary), material requisition (for stores withdrawals), material sheet (for material cost summary). As we said earlier, one of our policies is to tie PM into our regular work-order system whenever any repair work must be done.

Best way to show how we carry out our PM operating policies is to describe the use of each PM form. Why so many forms? Do we really need six? To help convince any doubting Thomases we'll name the underlying purpose of each one as we introduce it here:

Form 1—Unit Record Card. It's a letter-size white card, printed on both sides.

Purpose: To develop a maintenance history for taking corrective action in improving maintenance performance.

This is Quaker's equipment maintenance record. Unless you are dedicated to its purpose, don't waste your time keeping it. It's a lot of detail, but well worth it. A separate card is set up for each machinery unit, each building unit, and each facility (or utility) unit or major part thereof. Cards are filed in one complete file in order of unit number (Quaker plant accounting number) after they're grouped under major divisions such as building, floor, department, account, etc.

We record cost (in labor and material) of all repair work done on a unit (including an itemized list of parts replaced) and any significant observations. If repairs result from a PM inspection or breakdown, the initials "PM" or "BD" are entered just left of the "Material" column. This facilitates analysis for corrective action either in altering frequency of inspection or in mechanical redesign.

We don't clutter up the record with a list of inspections or routine maintenance (such as lubrication). There's no need for it. The running total of cost to date (extreme right column) is begun the first of each year, thus reveals trends.

Form 2—Motor Record Card. It's a letter-size aqua card, printed on both sides.

Purpose: To accumulate special history data on motors for periodic analysis of maintenance needs.

A card is set up for every motor or gearmotor and handled the same as the unit record card. Motor cards are filed directly behind cards of machine units on which they are installed. Front side of card (as shown) records test data for prognosis of performance. Reverse side (not shown) is identical to unit record card, is used the same way.

Form 3—Inspection Date Record. This is a 3x5-in. white card, printed on both sides.

Purpose: To record frequency of PM inspections for scheduling.

This is the heart of the system. It serves strictly as a tickler file to indicate when an inspection is due. We prepare a card for each unit record card and motor record card and file it by month in which inspection is to be made. If a unit must be inspected more than once a year, additional cards are set up accordingly. In no case, by policy, is this file used for more than one inspection a month.

For convenience in locating this date record when working from the

Begins on page 60

"There's a right way and a wrong way to install

unit card file, we cross-index the monthly date on the unit record card in upper right corner. After each inspection the date is entered on the date record. Thus there's no chance of forgetting to make one.

Frequency of inspection is based on manufacturer's recommendation, tempered by our own experience. Mechanical department head and maintenance foremen help determine original values. Changes are made when data accumulated on unit record card (or motor card) justify.

Form 4—Inspection Order. This is a white 4½x7-in. snap-out form, with one yellow carbon.

Purpose: To notify operating forces that an inspection is due.

Each month the PM clerk prepares an inspection order for every date record card. He then distributes orders to appropriate operating department heads, except for electrical orders, which go direct to the mechanical department manager. Rule is to make inspections promptly so any necessary repair work can be completed the same month.

The operating manager is responsible for instigating action. If he or his people inspect, they mark the results on the order and return the signed white copy to the PM clerk. If repairs are needed, the operating manager prepares a regular job sheet (work order) to authorize the work. (This then follows the regular maintenance work-order channels.) Remember, he controls expenses. By the same token, if he wants a maintenance inspection he issues a job sheet to cover and attaches an inspection order to it. Should any maintenance inspection then call for repairs, he must further decide whether they are justified and issue another job sheet to cover. If this routine sounds complicated, just remember that the operating manager must approve all maintenance work.

All job sheets originating from need for maintenance PM inspections or repairs are marked "PM" at the head of the form. Why? They rate priority in the mechanical department's planning and scheduling system over all but breakdown jobs.

Ultimately white copies of all completed inspection orders that flow back to the PM clerk can be sorted into one of two categories: "No jobs resulting" or "Repair jobs resulting." As the PM clerk receives completed orders he notes completion date on date record. At this time he also accumulates the orders in the two categories for use in editing a management report to be described later. For so-called running inspections by production, detailed instructions are usually not needed. Operators' ears and eyes are tuned to operating malfunctions.

But obviously internal equipment defects could be generating that are detectable only by a thorough examination in a stand-still or tear-down PM inspection. Skilled maintenance men—mechanical and electrical—must handle such inspections. To insure proper inspections, Quaker central staff has developed a 50-page manual on standard maintenance practices. It covers inspection and maintenance of major utility equipment items (such as motors, steam traps, magnets, fork trucks) and of production items such as Quaker "guns" and pellet mills. We furnish each mechanical manager with checklists to guide inspection procedures of buildings, facilities, and special equipment.

Form 5—Daily Running Inspection. A 3x5-in. white form, padded.

Purpose: To develop sense of responsibility in the machine operator for condition of equipment and to document maladjustments that otherwise might be overlooked.

Nobody knows better than an operator when his machine is not behaving properly. Quaker not only agrees, but does something about it. In many companies an operator may grumble or complain about the condition of his equipment, but it gets no further. So he becomes indifferent, lets his equipment go to pot.

Not so with this procedure. It's used only in the larger production departments by equipment operators when they detect the need for maintenance. (In smaller departments oral communications are used.) Operator fills in and gives the form to the department manager. He in turn investigates the need, and if it's justified, sends a job sheet to maintenance. Such requests bear no special designation and rate lowest priority unless work is urgent.

What are results? Men are taking greater interest in care of equipment. Operators write tickets because they know no *bona-fide* criticism will be rejected. Such confidence breeds better operators and keeps down maintenance costs.

Form 6—Breakdown Report. This is a 3x5-in. form, white, padded.

Purpose: To measure effectiveness of the PM program.

The number of your equipment failures is a reliable index of the success of your PM program. And the number of repetitive failures is a key clue to points that need improvement. Our breakdown report is the only way to get these failures posted onto the unit record card.

A breakdown is defined at Quaker as the failure of a piece of equipment to operate until needed repairs have been made, whether or not a production outage has occurred. For example, a fuse failure is a breakdown. It's considered as a single breakdown whether one or more fuses on the line blow at one time.

Whenever a breakdown occurs the operating manager must fill in the breakdown form for attachment to the job sheet authorizing repair. (Job sheet is headed with initials "BD" for top priority.) Production loss is stated in terms of cases, tons, cans, or whatever unit of product is involved. PM clerk records the significant breakdown data (not loss) on the unit record card (Form 1) when he posts completed job costs, with an identifying "BD" at left of "Material" column.

7 STEPS TO A GOOD START

There's a right way and a wrong way to install a PM program. We have found that when people know its objectives and what it will do for them, they will support it heartily. But if they don't understand it you're licked, because they are the ones who must use it properly.

Here are the steps we follow in setting up our standard PM program:

Step 1. We hold a meeting with plant and maintenance management

for review of basic aims, operation, and benefits of the program.

Step 2. The installer (central-office supervisor) surveys the plant as to size, type, amount of equipment. He talks with operating people, checks on personnel available for PM clerical duties. In short, we tell people "what we have" to develop their understanding. Then we find out "what they have" and put the two together into a suitable program.

Step 3. At a second meeting with plant management we propose a method of operation, lay out a complete flow for management to consider. Revisions are sometimes made in accordance with plant management's suggestions. You might call this combining the theoretical with the practical.

Step 4. We now develop the paperwork—take asset inventory, determine inspection frequencies—with help of a maintenance manager and a newly chosen PM clerk. All necessary files are set up.

Step 5. A third meeting is called. It includes plant, operating, and maintenance management. We review the actual application of the program, restate objectives, point out the divisions of responsibility for insuring good operation. In short we say: "This is the final package—it's up to you to make it succeed."

And it always has succeeded. We don't pretend perfection at the start. In fact, we tell our plants they will have minor irritations down the line that must be cleared up as the program takes hold.

How much time to install? We can do it in a small plant of 120 employees in one or two weeks' time. Larger plants may take three to six months if done piecemeal. Once the paperwork is set up for any whole or piece, the program should be clicking within the first few months. Something's wrong if it doesn't.

CONTROLS SET UP

Every program needs continuing follow-up to keep it healthy. For example, the central office supervisor visits each plant several times yearly to check progress, answer questions, and help in any way that improves over-all PM effectiveness in the plant.

But the ultimate responsibility for success of the program is placed on the mechanical department manager and the plant manager. To help them manage this responsibility Quaker has contrived a one-page monthly control report and a semi-annual equipment review.

Monthly Control Report—This report (shown on page 61) is made up monthly by the PM clerk in each plant. Basis for the report is the operating policy of month-to-month operation. Broadly interpreted it means: Everything scheduled this month must be inspected this month, and anything found wrong must be corrected this month. Occasionally there are legitimate reasons why inspections and resulting repair work are not completed on time. As a rule, however, this policy is upheld. Any failure to comply shows up on the monthly report, due the 10th of the month following.

Compilation of the report is purely a clerical task. It is developed by using data from columns of the various PM records as shown:

Col. 1—Department. List of operating departments or other divisional names, with a final line for totals. Small plants may include entire plant under one heading.

Col. 2—Inspections Scheduled. Total number for the current month. Source: Total number of "Inspection Date Record" cards in that month's file.

Col. 3—Inspections Completed. Includes current and overdue items. Source: Sum of number of "Inspection Order" forms filed in categories of "Inspections completed—no jobs resulting" and "Inspections completed—repair jobs resulting."

Col. 4—Inspections Incomplete. Total number of overdue inspections to date from start of program. Source: Obtained by subtracting Col. 3 from the sum of current Cols. 2 and 4 of previous month. If answer is not zero, reasons for each delay must be shown departmentally.

Col. 5—Items Found. Total number of items in current month needing correction. If six different features of one machine need repair, they count as six items. Source: Total of items on "Inspection Order" forms filed under "Inspections completed—repair jobs resulting."

Col. 6—Jobs Resulting. Total job sheets written to correct conditions in Col. 5. If six features on one machine are covered by one job sheet, it counts as one. Source: Number of different job numbers appearing on "Inspection Order" forms filed under "Inspections completed—repair jobs resulting."

Col. 7—Jobs Completed. Total of current and overdue jobs completed in current month. Source: Figure must be compiled progressively as completed job sheets flow back to PM clerk, using a work-sheet to tick off departmental accumulations.

Col. 8—Jobs Incomplete. Total to date. Source: Obtained by subtracting Col. 7 from the sum of current Col. 6 and Col. 8 of the previous month. If the answer is not zero, the reason for each delay must be shown departmentally.

Col. 9—Breakdowns. Total for month. Source: Total number of "Breakdown Reports."

Col. 10—Repetitive Breakdowns. Total of duplicate previous breakdowns of same part of same machine any time in previous 12 months. Source: Compiled by PM clerk as he makes entries on "Unit Record Card" forms. At end of report he must list and describe each repetitive breakdown, note recommendations or steps taken for remedy.

Col. 11—Fuse Outages. If more than one fuse on a line fails simultaneously, count as one. Source: "Breakdown Report" form.

Col. 12—Production Hours Lost. Total hours lost due to breakdowns, itemized by departments. Source: "Breakdown Report" form.

Extra notes at bottom of form are suggested whenever they will be helpful in interpreting unusual data. The mechanical manager is encouraged to list suggestions for improving the administrative program or for reducing maintenance costs on specific equipment.

Copies of report go to plant and

Begins on page 60

mechanical department managers and to central office supervisor. Supervisor further compiles a plant-by-plant cumulative report for comparison and study. This goes to corporate management, engineering management, and the manager of each plant.

Both reports are invaluable to PM progress. They provide finger-tip information that will highlight delinquent inspections and repairs and spotlight areas needing engineering improvement. They insure a continuing effort of diagnosis and cure of maintenance problems, so Quaker can keep its plants in the pink of condition.

Semi-Annual Review. Operating department managers also share in the responsibility for efficient and economical operation of the PM program. Twice a year they are called singly to the maintenance office to review the "Unit Record Card" forms for all equipment in their departments. These visits are scheduled by special cards in the "Inspection Date Record" tickler file. Where several departments are involved the visits are staggered evenly over the year.

Purpose is to scan each equipment history card for possible need of corrective action and to search for the best answer. This is in line with Quaker's basic policy: "Use this history if you're going to keep it!" Whenever a machine shows high maintenance cost or repetitive failures, the group in session reasons along these lines:

. . . *Can process be altered?* Can anything be done to the operation to eliminate the trouble? Example: Feed sacks were frequently falling off pallets in an automatic elevator and jamming the doors. Plant personnel found elevator was running too fast. Solution: Slow it down.

. . . *Will redesign help?* Is part weak or defective? Example: Hinges on knocker arms of a dust collector were constantly breaking. A stronger standard hinge was substituted.

. . . *Will periodic overhauls pay off?* Can a schedule be established to repair or overhaul the equipment at regular intervals while it is idle or before a breakdown occurs? Example: An air compressor is rebuilt every year during vacation shutdown. Chances of failure until next overhaul are so slim we don't need to invest in a standby.

. . . *Is periodic replacement justified?* Will the maintenance expense justify the purchase of new equipment? Example: A standard line of process pumps ran up heavy repair bills. We found it was cheaper to retire them as soon as wear reached a predetermined point.

. . . *Is different equipment justified?* Is operating equipment breaking down so often as to throttle production, although repair costs are nominal? Example: A wrapping machine in a production line was breaking down almost 100 times a month. Repair costs were not excessive, but production losses were high. We engineered a new design.

The semi-annual review is also an occasion for checking frequency of inspection. As facts and statistics accumulate on the equipment cards, they either confirm the correctness of the existing schedule or point to the need for more frequent inspections. Or they may even indicate less frequent inspections.

NOW—A LOOK AHEAD

From the start our program has been expanded and improved to its present status. We feel there is still more to be done to update the administrative procedures to meet the increasing complexities of operation. Our present method of accounting does not permit easy derivation of cost data on breakdowns, or on materials used in repairing a specific machine, or on maintenance work done by operating people on specific units. Ultimately these problems will probably be solved by some kind of mechanical or electronic tabulating and computing equipment. With its advent we can envision the development of standard machine parts numbers and breakdown-cause codes for quick and more accurate analysis of equipment performance.

Of this Quaker is sure: The program is fundamentally sound and serving us well. But with the trend to more automatic production equipment and its attendant auxiliaries, the PM program must also grow in comprehensiveness and ability to deal with these increasing maintenance complexities. This enlargement, however, will be in office equipment geared to match the degree of refinements sought in data processing. Large plant or small, the basic PM operating policies we are using seem so complete as to require little or no change.

Coming in February FACTORY...

Problem-Solving by Simulation: Blow-by-blow description of a dramatic new technique that you can use in your plant.

Maintenance Costs: The vital ratios in maintenance and repair in 680 companies, analyzed especially for FACTORY on Univac.

Management Appraisal: What's wrong with it today—and how you can shape a foolproof system.

Static Switching: What it is, why it's important to you now, and how to make it work in your plant.

Face up to it. You'll have these . . .

6 Key Workforce Problems in '59

So say 961 supervisors who speak up in answer to a brand-new survey. This year, the way you handle these problems could make you—or break you.

MOST CHALLENGING problem for plant supervisors in 1959 will be the increasing complexity of human relations. Sure, we've paid a lot of attention to supervisor-employee relationships in the past. And we've made progress. But this year, 1959, is the year when this problem may become the make-or-break factor in management progress.

That's the conclusion drawn by Glenn Gardiner, nationally known authority on supervision. It's based on the replies of 961 supervisors in 150 companies to a survey recently conducted by *Management Information* (Mt. Vernon, N. Y.), a news service for supervisors.

"Nine out of ten supervisors feel that if they can maintain good human relations this year, they'll be in best position to handle other problems," Glenn Gardiner told FACTORY editors. "Foremen realize that the immediate pressure will be for tighter cost control, improved quality, intensified maintenance, better customer service. But they are also more aware than ever that they must achieve these results through people."

SIX CHALLENGES AHEAD

Human relations is the common denominator of this year's supervisory problems, the survey shows. But analysis splits this generalization into six hard nuts to crack:

1. Sluggish attitudes—Of the supervisors polled, 43% named employee motivation as the toughest problem ahead. Many supervisors apparently want to learn more about psychology. And most of them express a need for specific techniques on how to motivate. Yet the survey gives little evidence of a desire to "crack down."

Gardiner's conclusion: Supervisors are not bucking the trend to better understanding of individuals. They want to understand the employee's viewpoint and win his cooperation by effective leadership.

2. Fear of technological advance—The majority of supervisors (54%) pin down introduction of new processes as a big headache in '59. They see new equipment installation and increased mechanical materials handling, too. While only 27% of them forecast paperwork simplification as a '59 problem, nearly half of an executive group do.

Gardiner's conclusion: The blush may be off the automation rose for plant management. But front-line supervisors are finding it hard to remain people-centered when confronted with technological change. They will turn more and more toward participative methods and group meetings to soften the impact.

3. Group resistance—Many supervisors (57%) see "teamwork as the best way to improve work output per man-hour." In other words, supervisors are beginning to speak up about the power of employee groups to aid or hinder production.

Gardiner's conclusion: Supervisors want help here. They have found that cooperation is long-term—not to be won overnight by lip service. They are looking for more conclusive ways to show employees the relationship of cooperation with company gains and worker welfare.

4. Strangled communications—Of the respondents, 84% say on-the-job communications will be more important this year. The survey shows over and over that foremen want to improve their man-to-man contacts. And they are vocal about it. "For my money, you can't beat people contact for any problem," says a Port Clinton, Ohio, supervisor. "Tailboard conferences before each job pay off in job understanding and safety," says a maintenance foreman in Ardmore, Okla.

Gardiner's conclusion: Employee communications may be an overworked phrase, but age should not block its effectiveness. He quotes a supervisor in Erie, Pa., who jotted this note on his questionnaire: "Communicate! Communicate!"

5. Half-baked performance—Majority (74%) of the supervisors checked the problem of keeping costs down; 60%, keeping quality up; 31%, better customer service. And 61% summed this up in terms of the key problem: improving employee performance.

Gardiner's conclusion: The supervisor's real job is to assure a full day's work for a full day's pay. To hold costs in line, he is asking for more help from higher management in setting realistic goals, adapting better instruction techniques, applying firmer controls.

6. Reluctant supervisors—Finally, Glenn Gardiner concludes from the survey that while supervisors are essentially management-minded, they want—and don't always get—closer participation with higher management. Conversely, while higher management wants to include supervisors as *bona fide* associates, it is critical and doubtful of supervisors because of their reluctance in many instances to assume managerial responsibilities.

WHO ANSWERED

The questionnaire was distributed by the Elliot Service Company (publishers of *Management Information*) to 10 supervisors in each of 150 manufacturing companies of good geographical and product diversification. Of the supervisors to whom these anonymous questionnaires were delivered, 64% responded. An executive in each of the 150 companies filled out a similar questionnaire. Gardiner reports a high degree of correlation between supervisory and executive replies.

Workbench halved

Old way—Compositors worked on benches 3 feet wide, had to walk to type cabinets across the room.

New way—Workbench is sliced in half, then butted on back of type cabinet. Top of cabinet serves as workshelf space. Compositor gets type from cabinet behind him.

Payoff—Combination benches take up half the floor space of old ones. New layout permits addition of two process operations.

Source—Department manager and employee conference.

Better Ideas—Better Methods

In this plant every man makes his own contribution to methods improvements. The ideas just keep rolling in. And so do the savings.

WORK SIMPLIFICATION is the big lever that Markem Machine Company (Keene, N. H.) uses to break loose methods improvement ideas. Ideas that improve customer service, reduce cost, or simplify the product line. Ingenious ideas like the ones illustrated on these pages—the four-wheel burring machine (facing page), for instance.

Fulcrum for the big lever of work simplification at Markem is teamwork—inspired by Coordinators Joseph A. Baute and Warren Fisher.

"Every man on every job has something to contribute," says Baute, Markem's one-time chief industrial engineer. "On that simple premise a work simplification program can extend a methods specialist's skill 100 times." That idea, plus normal work simplification techniques (FACTORY, July 1958, page 72), turns up big savings from all types of sources and people at Markem.

Here's a sketch of Markem's three-phase routine:

1. EDUCATE EVERYONE

Markem's program began in 1955. Since then nearly all of the plant's 275 workmen, supervisors, and department heads have attended one or more work simplification training courses. This training was broken down two ways :

. . . *Supervisors* participated in twelve 1½-hour sessions (all on company time). These were conferences consisting of lecture, film, discussion, and group problem analysis.

. . . *Employees* in production, offices, and laboratory—about 115 in all—attended five 1½-hour sessions covering similar material, but in briefer form. Much emphasis was placed on understanding work-simplification objectives and explaining how it will help employees. (At Markem, for instance, the company pledges that no one will be laid off because of a methods improvement. Installations are timed to either production expansion needs or normal attrition in the work force.)

2. APPLY THEIR KNOW-HOW

Education and appreciation are only the first step in a work-simplification program. Hard money in the till comes from the application and action phase. Markem assures action with a work simplification coordinator. That's Fisher's job now. He's a member of the industrial engineering department. Under Fisher's guidance and assistance, (when requested), foremen work together on project teams to select and solve specific operating problems. Each department manager must also select and lick a problem each month.

Markem's employee suggestion plan serves as another action channel, especially for hourly and clerical employees. But the company, following the recommendation of most work simplification authorities, pays no dollar awards for accepted suggestions. Employees are recognized by a letter from the president and by consideration at merit review time.

3. FOLLOW UP

Fisher is the built-in conscience of Markem's program. He keeps spreading the word, asking the probing questions. And he files a monthly project completion report that is assessed by top management. Department managers must also report project progress. From time to time Fisher and Baute conduct "capsule" refresher classes in work simplification for foremen and employees.

For both Fisher and Baute the program has provided an opportunity for self-development (Baute is now chief engineer.) For Markem employees, work simplification has proved rewarding—in profit-sharing dollars as well as in principle.

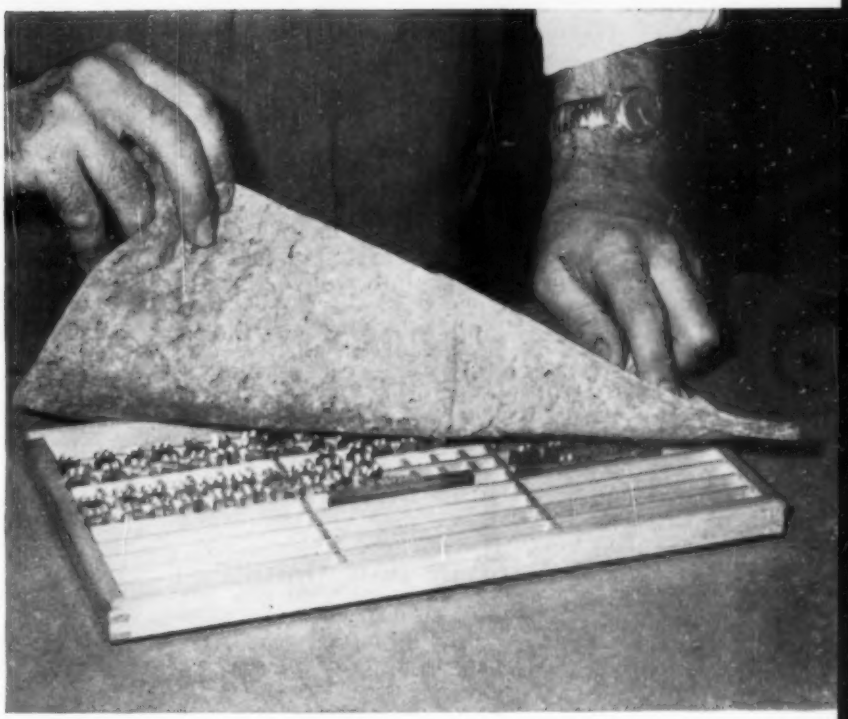
No more need for hand picking

Old way—To ship, employees used to pick each piece of type from tray by hand. Then insert group of different characters into small, separate envelopes, mark by hand. Time averaged one hour per machine.

New way—Type is left in tray. Cut-to-size sheet of resilient packaging material protects type faces. Packaging is completed by facing tray with wafer of corrugated cardboard, binding it to tray with masking tape.

Payoff—Packing now takes only 5 minutes. Saves $2500 per year.

Source—Employee suggestion.



Burring made automatic

Old way—Tiny type slug inserts were deburred by hand filing, one at a time, couldn't be tumbled.

New way—Inserts are fed into home-made automatic burring machine (shown in photo below). Machine has specially designed feeding fixture into which insert is placed. As operator forces insert down fixture channel, insert is exposed to wire brushing sequentially on each of its four faces.

Payoff—One operator eliminated.

Source—Industrial engineering department project.

Neater package — $4400 saved

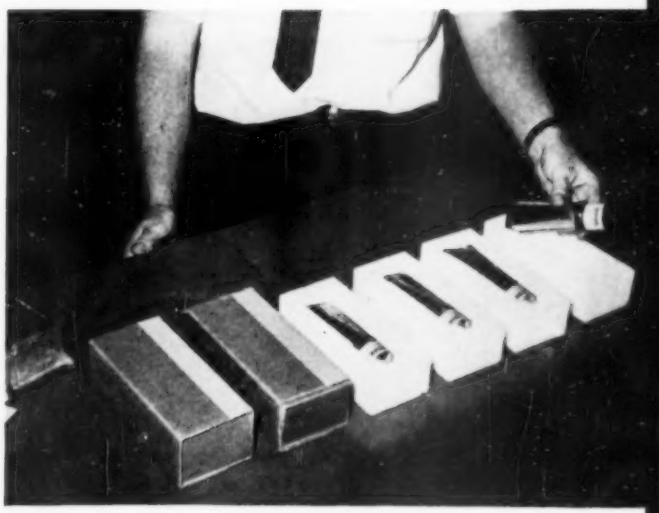
Old way—Ink tubes were packed with sawdust in individual chipboard boxes. Each box was then wrapped in cardboard and paper.

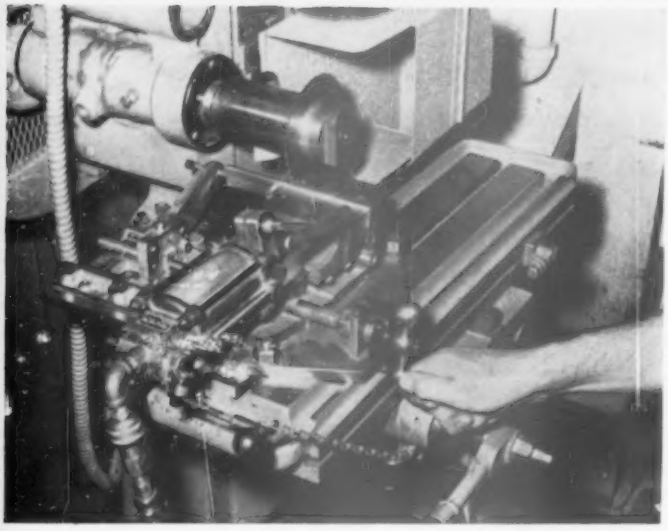
New way—Ink tube is set in molded Styrofoam block, which is then slipped into pre-fabbed cardboard container, ready for shipping.

Payoff—Net savings of $4400 per year. And a neater, safer package.

Source—Project of three department managers during refresher course.

Turn the page





Begins on page 68

$875 saved on burring

Old way—Brass type slugs were cut off with circular saw. To get correct length, vise stop was loosened with Allen wrench and adjusted to approximate position, then table was moved after test cut to get final position. Burr on slug was clipped off with hand shears.

New way—Vise stop is moved in and out by crank fixed to micrometer. An attachment added to the vise jaws holds slug insert until it is completely sawed.

Payoff—Set-up time decreased. No wrong sizes or trial cuts. Eliminated burring saves $875 yearly.

Source—Monthly department manager project.

Mold storage now simplified

Old way—It took from 5 to 20 minutes to find molds when filed by customer name. Bi-yearly discard of obsolete plates meant sorting through 50,000 molds.

New way—Molds are filed by date of customer order. Now any mold can be located in three minutes. There are drawers enough to hold two years' supply of molds. After two years, outdated molds will be discarded monthly simply by emptying drawers bearing old date. Molds removed from file on a re-order are returned to file under new date. This prevents any mold from being discarded before two years after its last use.

Payoff—Reduced sorting time worth $1500 yearly. Also improved customer service.

Source—Department manager and employees, after requirements were set up by conference of division and department managers.

Blueprinting coding speeded

Old way—Blueprints were coded with rubber stamps —date, shop order number, and other data.

New way—Figuring there's no point in a shoemaker's son not having good shoes, Markem uses its own product to mark prints. Wheel Head machine does all the jobs at once.

Payoff—Saves 150 hours per year of blueprint machine operator's time. Will pay off machine and type cost in five years.

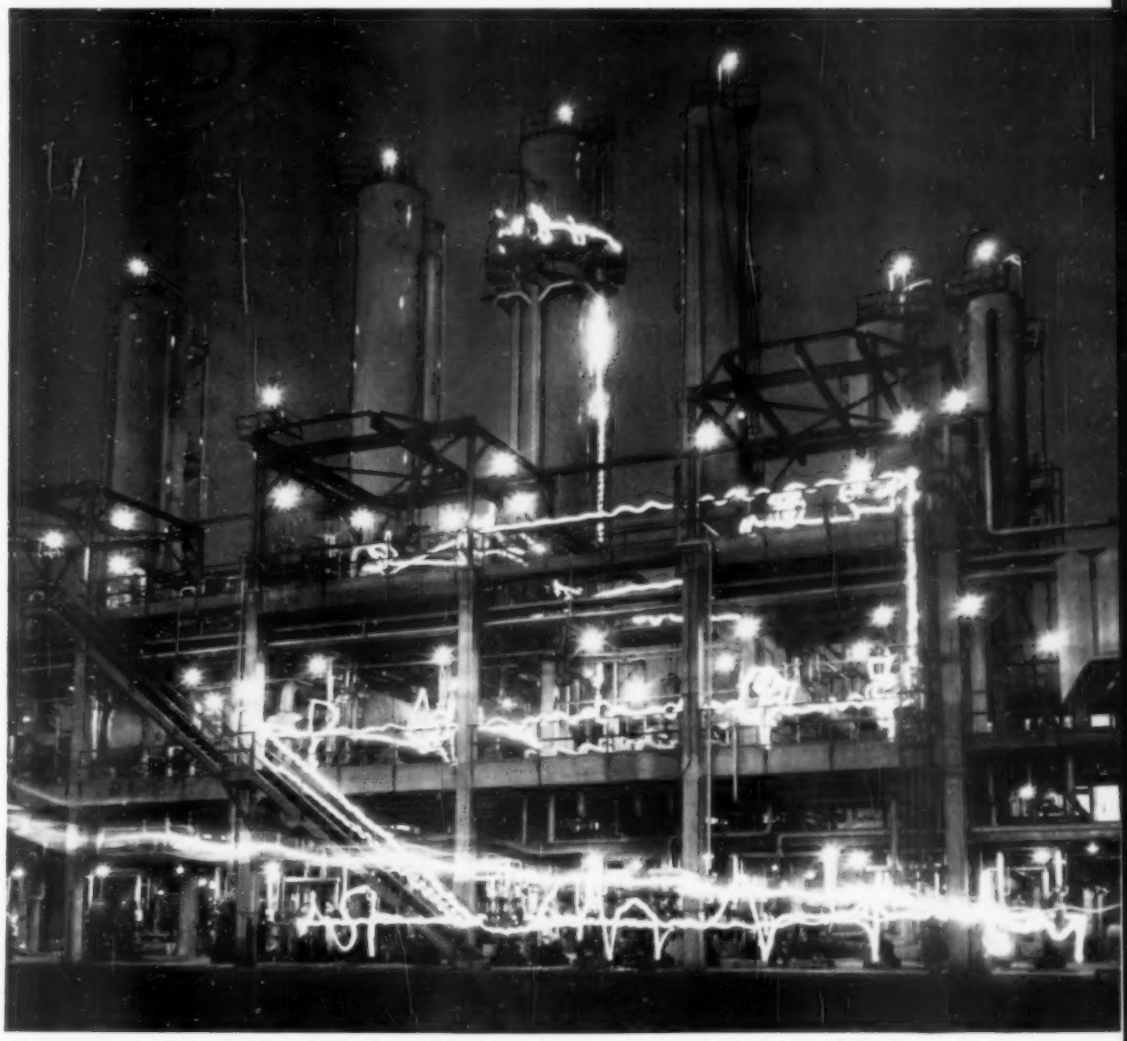
Source—Employee suggestion.

FACTORY

PLANT OPERATING MANAGEMENT

CASE BOOK

WARREN J. KING: EDITOR



WATCHMAN'S LANTERN ETCHES A RIBBON OF LIGHT AS HE MAKES HIS ROUNDS . . . PAGE 73

HIGHLIGHTS: Numerical controls pay off (p. 74) . . . easy steel handling (p. 75) . . . tell the news to workers (p. 76) . . . doing a sweet job (p. 77) . . . this machine shop's on wheels (p. 78) . . . non-skid potion (p. 80) . . . newest scholarship slant (p. 84) . . . four smart ideas cut factory costs (p. 85)

FACTORY CASE BOOK

NO. 16 JANUARY 1959

Contest Boosts Safety Record 72
New Network Communication Saves Thousands 73
Ribbon of Light Marks Path 73
Numerical Controls Pay Off Faster 74
Three Trucks Slip Honing Machine Into Place 74
Bad-Times Editorial 74
Four At-a-Time Welding 75
Handles Big Steel Members Easier 75
College Boys Win, Company Loses 75
Tape Holds Parts Down Flat 75
Better Handling Pays Off Fast 76
Flashing the News Day by Day 76
Simplifies Heavy Roll Handling 76
How to Do a Sweet Handling Job .. 77
Red Arrow Calls Inspector 78
Machine Shop Rolls Where It's Needed 78
Rate Yourself as a Manager 78
Screens Cut Cooling Costs $22,000 79
Tilt Makes Machining Easy 79
Helping Salaried People Move Up 79
Repair Bills Trimmed 79
This Foundation Is Built on Sand 80
Non-Skid Potion Cuts Breakage 80
Measures Effect of Pipe Corrosion 80
Ultrasonics Dusting 80
These Cost-Cutters Are Prize Winners 81
You Be the Arbitrator 82
No Cold Draft Here! 82
"Sit Down" Legman 82
Saves $200 a Month in Coolant Costs 83
Quick Glance Shows Where Jobs Are 83
Case Book Capsules 83
Huge Riveter Speeds Assembly 84
Photocopier Goes Where It's Needed 84
Newest Slant on Scholarships 84
Best Sniffer Yet for Fire, Smoke, Gas 84
Prevents Rail Siding Accidents 84
Four Smart Ideas Chop Costs 85
Two-Action Tool Cuts Handling 86
Grass Roots Problem Approach 86
Oven Takes to the Roof 86

Contest Boosts Safety Record

Willie B. Hurt is the name of the cartoon character in the picture above. He's the invention of The Trane Company's safety committee. Willie does everything wrong. His safety glasses are on his forehead. His sleeves and tie hang loosely so they can get tangled in machinery. His tennis shoes are two different sizes because he dropped a skid on one foot and lost some toes.

But he continues to be a safety stimulator even though the contest he was born to spearhead is over. It lasted three months and produced the best accident record in the company's history. During this period, every employee in winning departments of Trane's four divisions received a prize. And the total cost was less than $2000. Here's how the contest worked:

• Publicity started with a letter to every employee's home signed by the works manager. It announced the campaign, asked the cooperation of the employee.

• Plant newspaper and bulletin boards gave details of the contest. And Willie B. Hurt was introduced as mascot of the program in a full-size insert in the plant tabloid.

• A portable display to show off all the prizes for winning departments was routed through the plant. Winners could choose from 14 items, including a Scotch cooler, health scale, stainless steel silverware set, pen and pencil set, 2-gal. thermos jug, tackle box, outing kit, bit brace, food chopper, ice grinder, child's pool, fishing equipment and auto compass.

• Standings of each department were posted regularly.

• Department scores came from twice-monthly inspection by committees of three safety engineers and supervisors. Inspections were not scheduled, could take place at any time. Points were awarded according to the following schedule, with high score for perfect performance:

1. Up to 10 points were awarded on each of the following factors: condition of floors and aisles; condition of machinery, equipment and workbenches; stock and storage safety; use of proper tools; and machine guarding use of safety equipment.

2. Employee practices, including use of safety glasses, proper clothing, and personal protective equipment, could merit up to 30 points.

3. Medical treatment of accidents based on records of the medical department rated points, too. Departments with 40 or fewer employees got 20 points for no medical cases, zero if they had a medical case. Larger departments got 20 points for no medical cases, 10 points for one case, zero for 2 or more.

4. A lost-time accident disqualified the offending department for the current inspection period. It also subtracted 10 points from the department's total score.

Source: Earle R. Mahnke, Safety Director, The Trane Company, La Crosse, Wis.

New Network Saves Thousands

Faster, better service at a saving of $219,000 per year. That's the result of mechanized materials procurement at General Electric Company's Small Aircraft Engine Department (Lynn, Mass.). Of special importance to production: 65% of the 1200-odd parts used in any one engine model come from outside vendors. Many of these are high-precision parts that can tie manufacturing operations into knots if the procurement system fails.

Teletype was sheer necessity in this case. Normal methods of communication just couldn't keep up with the volume of the paperwork involved in ordering, purchasing, receiving, and inspecting. The new system simplifies the transmission of this information—connects nine strategic points in the plant directly to the purchasing department (photo) with 75 pieces of teletypewriter equipment. G-E leases these units from the New England Telephone & Telegraph Company for an annual fee of $30,000.

The teletypewriter units send and receive information in typewritten and tape form. Thus no deliveries of paperwork are ever necessary. For example, say a typist in material control puts an order on teletypewriter for Part No. 12345 with all pertinent data such as quantity, description, and inspection requirements. This same order is automatically and simultaneously reproduced in the purchasing department on a receiving teletypewriter.

Want more details? Here's how the system works:

1. Basic information on required procured parts originates in the production control department. Here a request-for-material form is initiated and put on a teletypewriter. At the same time the request-for-material form is reproduced in the purchasing department, a punched paper tape is also produced. This tape contains all the form data required in code, can be used later to reproduce automatically basic information about the order if needed. This makes manual retyping of basic information unnecessary throughout remaining steps in the procurement function.

2. Purchasing makes up a "Request for Quotation" from the tape, a request-for-material form, and any other information inserted by the buyer. When the tape is fed into the teletypewriter along with the request-for-quotation form, all previously typed data are entered at 100 words per minute. Then the typist just adds the new data.

To make this automatic transfer of information possible, G-E redesigned all forms used in its procurement operation. Now identical data appear in the same place on each form. For example, part number and part description are in identical spaces on request for material, request for quotation, purchase order, receiving report.

3. After vendor quotations are received and a vendor is selected, filed tapes plus new information supplied by the buyer are used to produce the purchase orders.

4. Receiving department gets a punched tape (instead of a purchase order) so incoming shipments can be identified and checked. Receiving clerks put tapes in envelopes, mark them with the part number, and file envelopes to await shipments.

5. When material arrives, receiving matches the packing slip with the tape on file, produces a receiving report automatically. At the same time incoming inspection gets full information on the shipment via teletypewriter. In turn, inspection transmits quality results (again via teletypewriter) to finished stores, production control, and others requiring this information.

6. As materials go into finished stores, the news is flashed to production control so records can be adjusted accordingly.

All through this procedure, accounting, production control, purchasing, inspection, and other interested departments can get vital control information through the manufacturing tabulating department. Manufacturing tabulating gets tapes as they're produced at key points, converts them to punched cards. Then it's a cinch to run a shortage report, a critical list, vendor delivery record, or what have you. Through the system, G-E has developed a vendor quality rating system covering these variables:

- Quality requirements of the parts or materials.
- Number of lots submitted.
- Acceptable quality levels.
- Sample size for a given group of quality characteristics.
- Number of defective pieces for groups of quality characteristics.

Ribbon of Light Marks the Path

(Cover Story)

Ever follow a shift operator on his nightly rounds—photographically? In most plants it's impossible because of walls and similar obstructions. But in a wide-open processing plant you can do it. And it makes an interesting picture.

Sun Oil Company's photographer took the cover photo at the Marcus Hook (Pa.) petrochemical plant in

three stages. First he exposed the film in daylight to get the plant in the picture. Second exposure, at dusk, got the plant lights. Then he made the final exposure in darkness. Left the shutter open while the operator made his inspection tour.

The operator's flashlight left a faithful trace on the film as he checked bearings, temperatures, pressures, vibration, and flow—climbed up and down stairs, ladders, and even the 90-foot tower in the center. As the operator walked off at the finish of his inspection tour he left the wavy, gradually ascending line in the foreground.

THREE TRUCKS SLIP HONING MACHINE INTO PLACE

Three drivers—with steady hands on the levers—made this tricky job easy at the Springfield (Mass.) plant of the American Bosch Division of American Bosch Arma Corporation. The job: lifting a 14,000-lb., 28-ft.-long horizontal honing machine without distorting its fine balance. Working as a close-order team under the direction of a rigger foreman, the three operators lowered the machine from a truck bed onto dollies. Operator skill combined with the watchful eye and directions of the foreman carried this difficult maneuver off successfully.

Numerical Controls Pay Off Faster

Does a numerical control system pay off on short-run jobs? Engineers at General Electric Company's Roanoke (Va.) plant found the payoff comes sooner than generally realized when they used one of their own packaged controls on a six-spindle drill. But they discovered that justifying the procurement of numerical controls means a new method for calculating payoff.

Thus G-E departed from the traditional direct-labor savings payoff method. This was done because introducing numerical controls changes many factors. For one thing, many indirect labor operations required for conventional machine operation are completely eliminated, others are cut to a fraction. Thus any evaluation of savings—or payoff—must take this into consideration. Furthermore, G-E engineers also claim that reductions in scrap losses, tooling costs, floor space, inventory and quality assurance costs must also be evaluated before full savings start to show up.

Six-month records kept on the numerically controlled drill (photo) show that new jobs go from design to production in hours, rather than weeks, now that jigs and fixtures are eliminated. And direct-labor dollars are paying for up to 16 times as much work on many jobs. Meanwhile, preliminary studies on a tape-controlled punchpress show even more outstanding results. The punchpress will be installed instead of three standard presses.

Bad-Times Editorial

You should enjoy the point of this well-stated editorial in the Ford Motor Company's *Rouge News* for Oct. 31, 1958. Here are the first few paragraphs:

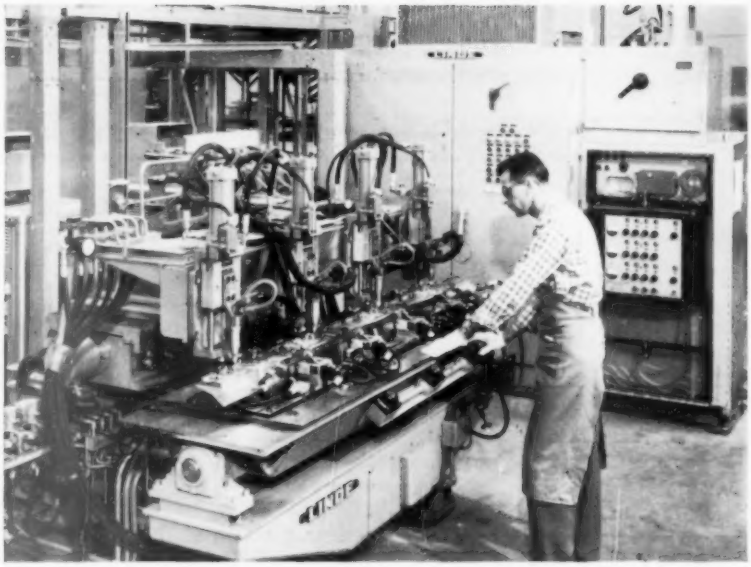
"The silence is deafening.

"Release of the company's third-quarter financial statement was followed by a loud silence from the critics of our 'profit system' who usually talk of industry's 'exorbitant' profits. Reason for the silence? Ford had no profits to report, and is 'in the red' for the first nine months of this year.

"The point, conveniently ignored by its critics, is that our competitive free enterprise system is not just a 'profit system'; it is a 'profit and loss' system."

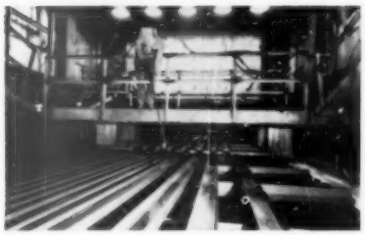
Then the editorial goes on to explain the part profits play in making jobs, supplying equipment, financing product research, etc. And there's a warning that the critics will be heard from again when the sales and profit picture improves.

This is an example of a widening practice in employee relations. More and more companies are seizing the offensive in matters of this kind. Have you ignored the opportunity to talk about your company profits now that you're not under attack? Remember, you can't do nearly as effective a job once the accusations have been made.



FOUR-AT-A-TIME WELDING SPEEDS PRODUCTION

This semi-automatic tape-controlled Heliarc spot welder takes the kinks out of Terier missile subassembly production at Convair Division of General Dynamics Corporation (Pomona, Calif.). Reason: It welds four parts at once. Heliarc method sidesteps the old way of making both sides of the joint accessible for resistance spot welding. Basic welding machine has four torches with hydraulic controls to position them horizontally. Vertical positioning is accomplished pneumatically. Tape contains predetermined location and condition data for each weld.



Handles Big Steel Members Easier

This king-size, conveyorized spray unit can coat over 200 tons of structural steel during an 8-hour day. And it transfers steel to the storage yard simultaneously at the R. C. Mahon Company (Detroit).

The 400-ft.-long unit handles structural members up to 200 feet long and as short as one foot. Supports 1200 pounds per lineal foot, and can process a 130-ft.-long, 52-ton girder, in about 30 minutes. This is roughly 2½ hours less time than with conventional methods. Conveyor speed is from 2 to 6 fpm.

Two spray painters and a relief man run the new operation. The 15-ft.-wide conveyor carries work past the two sprayers at staggered stations. The first is a pit-type booth under the conveyor. As the steel member passes over it, the sprayer coats the underside. Second booth, positioned over the line (photo), features a catwalk that the worker moves up and down with pushbutton controls. From the second booth the steel travels via conveyor through a drying area, then to the yard. By the time the painted steel reaches the outdoor unloading section, it's dry enough for handling.

College Boys Win, Company Loses

Here's a point for industrial relations managers to watch on those summer jobs for college students. The Arizona State Employment Security Commission upheld a ruling permitting seven college students to draw unemployment compensation. The reason: Summer jobs they held in 1957 with Phelps Dodge Corporation (Morenci, Ariz.) were not available last summer. Earlier Phelps Dodge brought suit in a superior court over a similar case involving 16 other students.

Eligible students will receive unemployment pay of $28, $29, or $30 a week over a 13-week period, depending on individual cases. Phelps Dodge protests that compensation paid students will come from the general unemployment fund and will result in a "consequent reduction of said fund to which plaintiff is a sizable contributor." As a result of the decision, Phelps Dodge said it "might be compelled by business necessity to discontinue its program of summer employment for qualified college students."

Tape Holds Parts Down Flat

Double-sided pressure-sensitive tape solved a tough work-holding problem at The Heald Machine Company (Worcester, Mass.). As a result, production has increased 300% on a grinding operation. Parts involved were brass disks, an essential feedbox component for Heald's internal grinders. These units must be ground to extreme flatness.

Because the brass parts can't be held on a magnetic chuck, they used to be secured in place with steel strips. Complexity of the chucking operation held production to about 25 parts per hour until the new holding method was devised.

A trial showed double-sided pressure-sensitive tape is ideal for achieving the flatness desired. In addition, the tape simplifies the chucking operation and reduces scrap to a negligible point. In fact, the technique has proved so successful it is also used in some cases for grinding carbide tools.

Better Handling Pays Off Fast

"How new can you get?" was a leading question when the Pacquin-Leeming Corporation decided to vacate an already modern plant and build a brand new one in Parsippany, N. J. But the move to the new 86,000-sq.-ft. facility brought improved manufacturing techniques. Especially in the materials handling and order-picking area. Here new equipment and procedures for moving cartons of some 30 drug and cosmetic items produced in the plant will pay for itself within two years.

Use of gravity racks for pallets and cartons plus a power conveyor makes order picking easy, gets cartons to the shipping area efficiently. The new system has brought about the following economies:

1. Order picking now requires only eight man-hours per day compared to 26 previously.

2. Order pickers walk an average of only 20 to 30 feet to get up to 75 cases for an order, compared to the 110 feet they had to walk previously. And this really adds up when you consider that as many as 300 orders leave the plant daily.

3. Order-filling accuracy has improved greatly in the new plant.

4. A lift truck operator who formerly took palletized orders from the picking area to shipping has been transferred to other duties in the plant. The conveyor now takes care of this automatically.

5. The area required for order-filling facilities dropped from 9600 square feet in the former plant to 2800 in the new. Also a temporary storage area previously used for orders awaiting trucks in the shipping department is now unnecessary.

6. Palletflow racks (right) even provide a mechanical return feature for empty pallets.

With the new system there's no prefilling or temporary storage of orders on pallets. They're filled as soon as the truck arrives at the loading dock. The order picker then takes cartons from the Palletflow and Versarack (left) racks, places them on the conveyor, which takes them right to the tailgate of the over-the-road carrier.

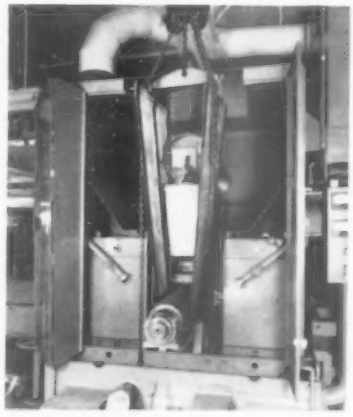
When not filling required orders, the order picker helps the stock checker keep racks (made by M-H Standard Corporation of Jersey City, N. J.) full. In addition, both these men spend a good part of their working day in the production area of the plant.

Flashing the News Day by Day

"The Daily Spirit" is an apt name for the newest employee service at Hiram Walker & Sons, Inc. (Peoria, Ill.). It's a news sheet of up-to-the-minute plant and general news including the weather report and daily television schedule.

The daily news sheet supplements the company's monthly employee magazine. It's produced by the company's publicity department on a single, yellow 8½x11-in. sheet. A local TV station's news staff helps out by providing publicity items and make-up advice. Plant news gets top play in the news sheet; general news, just a few paragraphs.

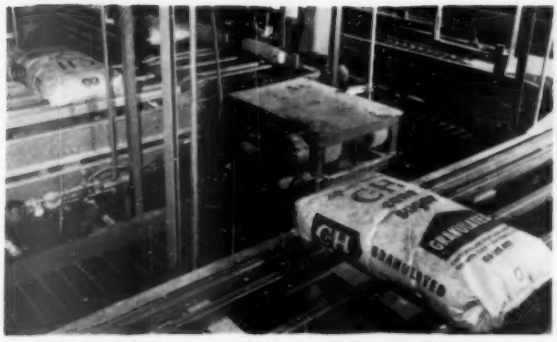
Full value of "The Daily Spirit" was dramatized last spring when a strike crippled the city newspaper plant for several weeks. This not only prevented Hiram Walker employees from reading the news but also kept them from getting daily TV schedules. To remedy this, the company printed daily TV schedules for all local stations on the reverse side of "The Daily Spirit." Feature proved such a hit with employees it was continued after the strike was settled. The whole publication has been so popular in the Peoria plant that the company has started a similar sheet in its home plant at Walkerville, Ont.



Simplifies Heavy Roll Handling

With a simple handling method, using a canvas sling, Behr-Manning Company (Troy, N. Y.) can remove heavy grinder rolls 80% faster and cut injury hazard to the vanishing point. The technique is used on contact or billy rolls up to 60 inches long, weighing from 700 to 1000 pounds.

The improved method starts with cutting and hinging a section in the top of the machine housing. This gives the monorail-mounted sling easy access to the roll. After the sling is in place so that it cradles the roll, the roll is disconnected, raised slightly to clear the ends, then pulled out of the machine and lowered onto a dolly.



1. SORTING KEEPS LIKE BAGS TOGETHER.

2. ARRANGING INSURES FIRM PALLET LOADS.

3. PALLETIZING MAKES TOUGH JOB EASY.

4. ROUTING GUIDES LOADED PALLETS RIGHT.

How They're Doing a Sweet Handling Job

Materials handling has a new look at the Crockett (Calif.) refinery of California & Hawaiian Sugar Refining Corporation. Here a 7300-ft. maze of conveyors carries 120,000 units daily from packaging stations on the second, third, and fourth floors to eight automatic pallet loaders on the second. Then more conveyors and two automatic elevators transport palletized loads to the main floor storage area.

Granted, automatic pallet loaders aren't new. And the two for handling standard-size cases of packaged sugar follow the standard pattern, as do the three loaders for handling 60-lb. paper bales containing 5- or 10-lb. consumer packages of granulated sugar. Units handle cases at the rate of 30 to 35 per minute. Bales are paced at 25 per minute.

But the system for palletizing 25-, 50- and 100-lb. paper bags of bulk sugar is much more complex. The many sizes and handling characteristics peculiar to the various types of sugar required special design by C&H engineers and Lamson Corporation (Syracuse).

Was it worth the effort? According to C&H's operating executives, it sure was. In addition to the obvious economies of efficient materials handling, the new system offers these added benefits:

- Reduced package damage during palletization cuts rehandling and container costs.
- Better balanced, more uniform pallet loads result in more efficient storage.
- Easier and more flexible production scheduling saves headaches.

Now here's a brief rundown on the system for handling 25-, 50- and 100-lb. bags:

1. Sorting all 50- and 100-lb. bags is done as they come from the production area. One operator at the console of a General Electric static control system takes care of this operation, routes bags to any of six accumulator lines at rates up to 30 per minute. As bags reach preselected transfer points on the live roll conveyor bringing them from production, continuously running V-belts positioned between the rolls automatically shunt them to any of six transfer lines feeding accumulator conveyors. Transfer is accomplished when an air-operated cylinder raises the V-belt transfer at just the right time.

The picture (top left) shows two transfer lines moving 100-lb. bags to accumulator lines at right. The bag supply conveyor line (not shown) is perpendicular to these lines and off to the left. In addition to the six accumulator lines fed through the sorting station, four other accumulator lines—including two for 25-lb. units—receive bags directly from the production area. All accumulator conveyors are suspended from roof trusses.

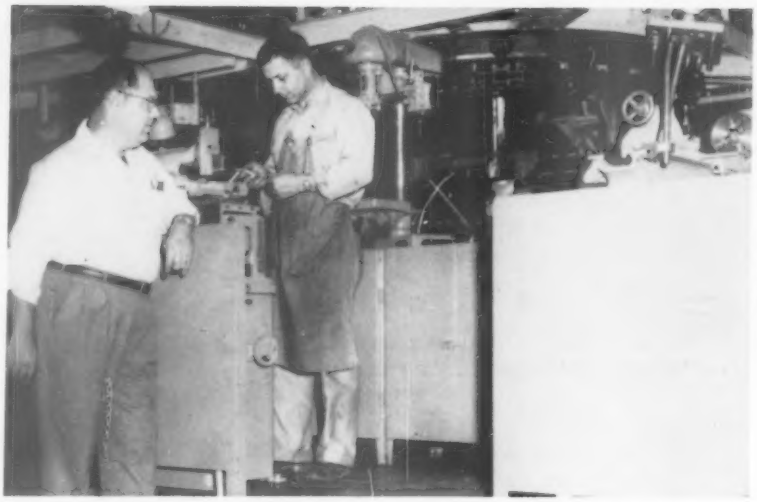
2. Arranging properly interlocked layers is done automatically (top, right) as bags feed from the accumulator conveyors into pallet loaders. A rotating pin and ram take care of properly orienting bags. After a layer is complete, a stripper plate retracts from under the layer, dropping it a few inches onto a pallet supported from below. This action is repeated until a full pallet load is formed and discharged. The rate for

palletizing bags varies from 20 to 30 per minute, depending on the item being handled.

On several pallet loaders a traveling carriage lowers lateral spacing blocks. This insures proper spacing between items, makes for a more secure, better balanced load. Also an automatic multiple-position package stops thrust up between rolls to provide spacing perpendicular to the ram.

3. Loading 60x44-in. pallets with as much as 4500 pounds of sugar is an easy job with the oversize pallet loaders on the refinery's second floor. Then chain conveyors start full pallets on their way to storage. All of the plant's eight pallet-loading units feed into a common conveyor system. Fork trucks keep the loaders' pallet storage magazines filled. Each holds eight pallets, or enough for up to a half-hour run under normal conditions.

4. Routing loaded pallets to storage is accomplished by two turntables and several conveyor spur lines. As pallets leave loaders a control operator sends them on to one of four destinations. If a pallet goes through the turntables, it's headed for a storage area on the same floor. If turntable sends it on the three lines to right and left, pallet is headed for an automatic elevator. These elevators take the sugar to the first floor, where fork trucks transfer the palletized material to exact storage locations.



MACHINE SHOP ROLLS WHERE IT'S NEEDED

Takes only minutes for maintenance machinists to get to the scene of a breakdown and set up shop with this 5x10-ft. shop on wheels at Ford Motor Company's San José plant. Equipment aboard includes a lathe, shaper, drill press, grinder-bell sander, workbench. And there are cabinets for storing hand tools as well as a waist-high protective shield surrounding the equipment. For power, the shop operator plugs into any 440-volt electrical outlet. A 440-volt transformer provides right power for each piece of equipment. In-plant handling equipment hooks onto the 3000-lb. mobile unit and pulls it around the 32-acre assembly floor.

Red Arrow Calls Inspector

When a red arrow points up it means a mill operator has a first piece ready for inspection. This simple idea cuts waiting time for the 10 operators in the mill section of the Apparatus Division's machine shop at Texas Instruments, Inc. (Dallas). Also cuts out plenty of walking for the department inspectors.

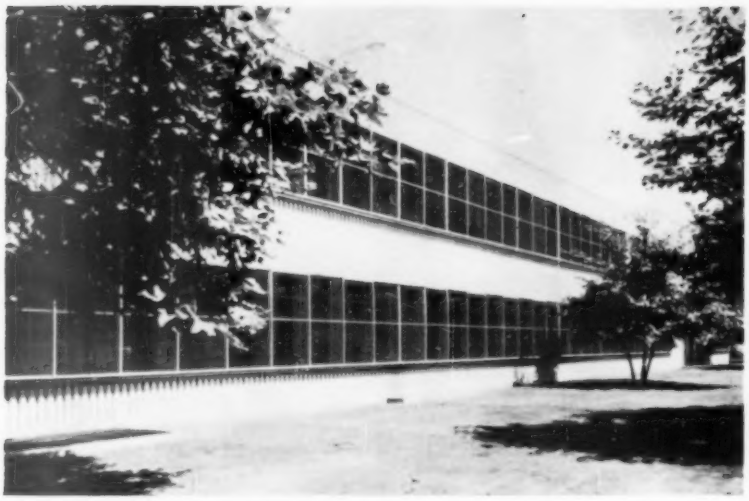
Each small red metal arrow is mounted on a magnet. This way, the machine operator can place it in an easily visible location on his machine just before time for inspection. As the inspector periodically scans the shop, he can see where he's needed. He's able to schedule inspections more efficiently. Before the arrow idea, operators had to stop work and seek out inspectors when the time was right.

Rate Yourself as a Manager

Here's a fast way to figure how much of a manager you are. The University of Michigan (Ann Arbor) suggests you simply ask yourself how much of your working day is spent on the following 15 tasks:

1. Determining goals for your work group.
2. Establishing and interpreting your policy.
3. Scheduling work.
4. Developing procedures for getting the work done.
5. Budgeting money, people, equipment, and supplies for jobs.
6. Organizing work to be done under your direction.
7. Delegating authority and responsibility to others.
8. Establishing working relationships among your subordinates.
9. Selecting new members for your organization.
10. Paying subordinates fairly.
11. Communicating up and down your organization.
12. Helping subordinates develop managerial skills.
13. Setting job standards.
14. Checking performance against the standards.
15. Seeing that there are records and reports of work done.

These activities distinguish management from other types of work, according to the president of Louis A. Allen Associates (Palo Alto, Calif.), management consultants. For the president or top manager, they're practically a full-time proposition. But managers at all levels are also concerned with operations —actually getting the work done. And the further down the management ladder you are, the more you're concerned with operations. For ex-

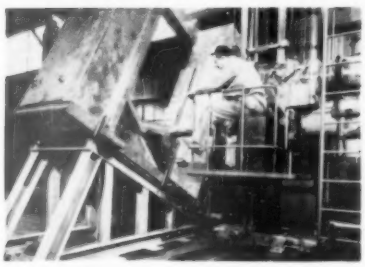


SCREENS CUT COOLING COSTS $22,000

By shielding its windows from solar radiation, Hughes Aircraft Company (Culver City, Calif.) saved the expense of installing an additional 45 tons of air-conditioning equipment. New screens (Reflectal Corporation, Chicago) are made of 0.05-in. wide and 0.005-in. thick bronze wires running horizontally. These tiny louvers are permanently set at a 17-deg. angle, are secured and wrapped by vertical wires spaced every half-inch. Called "Koolshade," the screens rebuff about 87% of solar radiation without impairing horizontal visibility. Because they're made of non-corrosive material, the screens need not be removed in wintertime.

ample, foremen and others on the "firing line" (or first level management) spend about half their time managing and half operating.

So there you are. Figure your own percentage—leaving out coffee breaks—and compare it with these standards. Better yet, compare it with those of your colleagues.



Tilt Makes Machining Easy

The man above is machining a huge steel frame for a 500-ton scrap press. With the positioner supporting the V-shaped weldment, machinists at Baker-Perkins Company (Saginaw, Mich.) can finish machining angles in a horizontal plane with a Giddings & Lewis horizontal boring mill. Angle of tilt: 25 degrees.

It takes Baker-Perkins 20 to 24 hours to machine one of these giant, 27-ton frames. The company is building 10 units on contract, has already completed eight. It takes 300 hours to build the frame prior to machining. Each frame will eventually house a shear blade big enough to slice through a 20-in. steel I-beam just as easily as a hot knife cuts through butter.

Helping Salaried People Move Up

Qualified salaried employees have an orderly way of making sure they're considered for better jobs at Thompson Products, Inc. Key to the procedure is a form called the Salaried Position Request (SPR). Here's how it works:

. . . *Any employee* applying for a better job fills out the SPR form. On it he details his experience, education, special qualifications. Also gives present position and the one he's applying for.

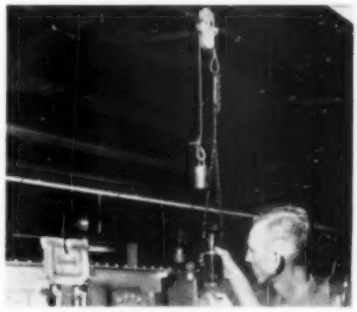
. . . *The applicant's supervisor* signs the form. This signifies the employee is performing satisfactorily on his present job. If his performance is not satisfactory, the supervisor must explain.

. . . *Personnel* interviews the employee, evaluates his ability to fill the job he has requested. If he's qualified, the form goes in the active file for that job.

. . . *The requisitioner* interviews the employee when an opening occurs, makes the decision to accept or reject him for the job.

To keep the operation up to date, request forms are reviewed every six months. And they are cleared out at the end of every year. Employees who want to keep their requests active for more than a year must initiate a new one.

Source: T. C. Horton, Manager, Employee Services, Thompson Products, Inc., Cleveland.



Repair Bills Trimmed

Damage to pyrometers used to cost Adamas Carbide Corporation several hundred dollars a year. Cause of damage was from routine handling of the delicate instruments as well as from dropping them. Through installation of a simple pulley system (photo), repair costs have dropped to near the zero mark.

With this new pulley mounting, an optical pyrometer travels along the front of a line of furnaces. The expensive instrument is spring-mounted on a counter-balanced chain-cord combination suspended from a double-ended pulley (the kind used for greenhouse shade control). The top pulley rides along a cable between building support posts.

Source: Gerard Scheyer, Plant Engineer, Adamas Carbide Corporation, Kenilworth, N. J.

THIS FOUNDATION IS BUILT ON SAND

Loose to medium-dense sand need no longer be an obstacle to engineers designing foundations for heavy structures. Unstable soil can now be transformed into a compact mass capable of supporting even the heaviest dynamic loadings. It's being done at Edgewater Steel Company's new office building site in Oakmont, Pa., by Vibroflotation Foundation Company of Pittsburgh. With the technique called Vibroflotation, compaction results from simultaneous vibration and saturation of soil with water, using a tubular instrument six feet long that develops a 10-ton centrifrugal force. This eliminates voids and also rearranges particles into a tight mass to the desired depth of the area involved.

Non-Skid Potion Cuts Breakage

Boxes don't come tumbling down as easily as they used to at Miller Brewing Company's Milwaukee warehouse. Answer is Ludox, a new colloidal silica produced by E. I. duPont de Nemours & Company. When added to carton surfaces, it keeps them from skidding off pallets and mechanical handling devices.

Tests at Miller proved the silica treatment reduces the likelihood of slippage during transit by 50%. This is especially important as the Miller warehouse is built on three levels. Thus handling trucks go up and down ramps when passing from one area to another. Miller found silica-treated cartons can stand a 30-deg. tilt, while untreated cartons tumble at 15 degrees.

Measures Effect of Pipe Corrosion

The man (photo) is checking his process piping for corrosion with a new electronic measuring technique. It may offer you a method of slashing cost of controlling internal corrosion in process equipment and pipe lines, help plant engineers determine how much inhibitor to use.

The new technique (Crest Instruments Company, Santa Fe Springs, Calif.) spots changes of a millionth of an inch. Here's how it works: Engineers feed a two-element probe made of the same metal as the processing equipment into the corrosive environment. One element is exposed, the other protected by a plastic or ceramic coating. Naturally the unexposed element corrodes while the second element remains unharmed. Thus by comparing the resistance ratio of the elements, a daily—or even hourly—check of the corrosion rate can be maintained.

Usually the optimum conditions for minimum corrosion can be determined in a few days. In one test, by knowing the right inhibitor concentration, engineers reduced corrosion rate 75% in 36 hours.

Ultrasonics Dusting

Ever think of using ultrasonics for cleaning precision subassemblies before final assembly? Works fine for Karnish Instrument Sales and Service, Inc. (Lock Haven, Pa.), manufacturers of aircraft instruments. Reaches right into small holes and apertures to remove dirt better than anything used before.

The aircraft instruments made by Karnish are brass, aluminum, and magnesium. They require removal of jeweler's rouge, cutting oil, and similar contaminants. Similarly, instruments being reconditioned often need corrosion removed. In either case, assemblies and subassemblies are cleaned one at a time while they're suspended in the proper cleaning solution on hangers. Immersion time varies from two to 10 minutes depending on the contaminant to be removed. For cleaning assemblies Karnish uses a SonBlaster unit with a 1-gal. stainless steel tank (Narda Ultrasonics Corporation, Westbury, N. Y.).

SORTS DAY'S SUPPLY IN 10 MINUTES

FACILITATES RE-USE OF SCREWS

SPEEDS ASSEMBLY WITHOUT INJURY

BOOSTS PRODUCTIVITY, CUTS FATIGUE

These Cost-Cutters Are Prize-Winners

That's right! They're ideas taken from prize-winning methods films that received top honors in competition sponsored by the Industrial Management Society (Chicago). This competition was held in conjunction with IMS's annual management clinic in November. Now entries are in IMS's film library, can be rented for a nominal fee.

The four pictures above show methods improvement ideas covered in the first- and second-place winners in the two industrial film classes. One group was for plants employing over 1000 workers, the other for plants having under 1000 employees. In addition, prizes were awarded to entries dealing with methods work in universities, with office procedures, and with training techniques. Rating factors used in judging the entries included tools and techniques used, reduction in fatigue, stimulating effects, savings realized, and quality of presentation.

Here are capsules of the first and second prizewinners in the two industrial categories:

Over 1000 employees . . .

First prize—Texas Instrument's Semiconductor Component Division (Dallas) reaps an estimated annual saving of over $4000 from a $10 investment. This improvement (upper left photo) is a new method for sorting tiny silicon crystal wafers used in the production of glass diodes. Formerly operators did sorting manually, using a magnifying glass and tweezers. It's important to use only the right-size crystals or machines that perform ensuing operations will jam.

Now two sieves take care of the sorting while an electric doorbell supplies the vibration needed for the sorting operation. Under the vibrating action, large particles stay in the top sieve, desirable wafers in the second sieve, and small fragments drop through to the table top. Using the new method, an operator classifies a day's production requirements in 10 minutes.

Second prize—Kellogg Switchboard and Supply Company (Chicago) saved over $800 the first year on an assembly operation, thanks to $30 in new tooling. In assembling a shaft, gear, spring, retainer, and spring washer used in a ringing generator, the operator used to make one unit at a time in 0.33 minutes. Complained she injured her fingers as she secured the final spring washer in place with special pliers.

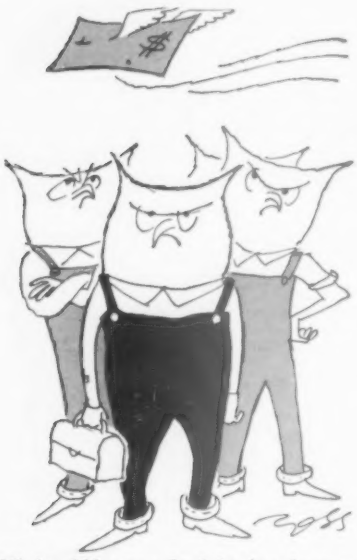
With the new assembly method (photo, lower left), the operator puts two units together simultaneously in 0.40 minutes. And there are no complaints about injuries, either. All the parts are first set in place in the two-place fixture. Then the operator uses two specially designed cylinders to force the spring washers in place. The extra han-

YOU BE THE ARBITRATOR

THE CASE OF

The "Night Owl" Dayworkers

Out of the experience of the American Arbitration Association



Night-shift pay schedules in a bronze foundry included a 10% differential. A contract provision also guaranteed shift employees this premium whenever they were "temporarily transferred to aid and assist employees on the day shift."

With the curtailment of production schedules last spring, the night shift was temporarily abolished. Nine men were transferred to day work and assured they would go back to their old schedules when business picked up. This actually happened a few months later.

Meanwhile, these nine workers weren't getting a shift bonus as they thought they should. "This is a temporary transfer brought about at the company's initiative," argued the shop steward. "The men should retain their premium."

The company didn't agree. "The contract requires us to pay night-shift rate only when we transfer a man for our convenience, not when we lay off a whole shift."

Eventually, the case went to arbitration. Suppose you were the arbitrator. How would you rule?

For the actual decision turn to page 86

dling involved in using the cylinders is more than compensated for by elimination of the pliers.

Under 1000 employees . . .

First prize—Union Steel Products Company (Albion, Mich.) had many improvements in toolroom operation. One was a $45 multi-compartment hand truck (photo, top right) for storing salvaged Allen screws by size. Annual saving: $2055 in materials and labor.

Before use of the hand truck, screws salvaged from old tools, fixtures, and dies were tossed unsorted in a tote box. Thus when a toolmaker needed a screw he just looked for it. This wasted time, usually resulted in needless requisitioning of new items. Now men find the units they need fast. And the truck is just the right size so it can be stored under a work bench.

Second prize—Rutherford Garment Company (Rutherford, Tenn.) increased productivity substantially with the sleeve-pleating method shown in the lower right photo. Annual saving totaled $955 on an investment of only $45.

In the old method the operator picked up a sleeve section for a jacket from the bundle, pleated it, then pushed it to the rear. Sleeves were connected in chain-like fashion, had to be separated and re-stacked by the operator when a bundle was completed. Breaking sleeves apart was fatiguing to the operator as well as time-consuming.

Now the worktable has been cut off close to the sewing head. A clamp holds an entire bundle of sleeves near to the work area. This lets the operator pick up a sleeve, sew the pleats, clip the thread on a trimmer, and push the sleeve aside while the bundle remains properly stacked and in the right order. The new method gets the job done faster, is less fatiguing.

No Cold Draft Here

Even when this 18-ft. high door is wide open on a wintry New England day, the cold air can't rush in. A curtain of forced air coming from the overhead outlet keeps out the chill, thus makes working conditions a lot more comfortable and healthful at General Electric Company's Medium Steam Turbine, Generator, and Gear Department in West Lynn (Mass). And the air curtain helps keep dirt out of the shop, too.

The passage of a stream of air downward across the entrance forms an invisible separating wall, keeps cold air out even when door is open for long periods to admit trucks and rail cars. To counteract variable entrance conditions caused by wind or pressure differentials, the system automatically controls the direction of air discharge. For a balanced condition, air travels straight down. But to counteract exterior pressure or wind, air flow is directed outward.

Designed by American Air Curtain Corporation (St. Louis), the system operates only when the door is open. Operation is actuated by a limit switch in the door-operating mechanism. Steam coils in ductwork heat air to discharge temperatures between 95 and 105 F. However, the air temperature drops 10 to 20 degrees before reaching the floor return vent.

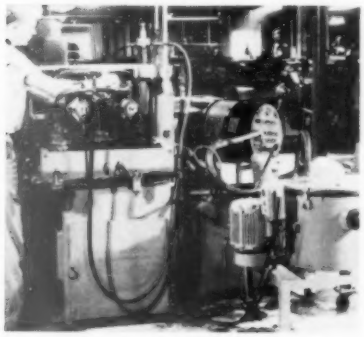
Sit-Down "Legman"

Reading "legwork" of engineering and business publications is done by a junior engineer at International Business Machines Corporation, Electric Typewriter Division. The young engineer spends half an hour per day scanning publications. He routes items of interest to plant

service engineers and managers. And when he comes across an article or advertisement he thinks will interest someone outside the department, he routes that, too. All told, savings are estimated at five managerial man-hours per week.

The job isn't one-sided in its benefits. It helps the young engineer, too, by keeping him abreast of current developments. And he learns the functions of the engineers and managers in his department.

Source: M. C. Blodgett, Functional Manager, Plant Services, International Business Machines Corporation, Lexington, Ky.



Saves $200 a Month in Coolant Costs

This portable centrifugal clarifier saves $200 worth of coolant each month at the Hartford Screw Company (Greenville, S.C.). It also eliminates frequent draining and filling of coolant sumps.

Used with a number of centerless and cylindrical grinding machines that finish aluminum spindles for textile mills, the 14-gpm. clarifier moves into place on its casters, connects right into coolant return line for continuous operation.

Now the coolant isn't changed until it breaks down chemically. Former settling method of removing abrasive grains and metal particles meant that some coolant was lost with waste during cleaning. Savings in coolant alone paid for the unit in first year of operation. And the clarifier itself (DeLaval Separator Company, Poughkeepsie) is cleaned by simply emptying its 3-gal. dirt bowl. Another bonus: Since installation there's been no maintenance on the clarifier.

Quick Glance Shows Where Jobs Are

This pegboard provides a simple means of scheduling work within the machine shop at Texas Instrument's Apparatus Division in Dallas. It lets supervisors know at a glance what job each machine is working on and what jobs will follow. At the same time, it tells machine operators just what to do.

The board's layout is the same as the shop's. Each plate with peg attached represents a machine. Tags hung on the pegs identify job being processed. Numbered plates along the top of the board designate machine groups. And the tags hanging from the two rows of hooks just below tell what jobs are ready for production by machine group. Priorities are shown by a top-to-bottom arrangement of tags, with top one being the highest priority job. Thus shifts are easily made to reflect latest scheduling developments.

Tags come with work orders from the scheduling department, are hung on the board on the proper peg as the job starts through the machine shop. As one machine operation is completed on a work order, the tag is moved to the waiting peg for the next operation. In this way it follows the job through the shop from start to finish.

Essentially a job shop, the Apparatus Division's machine shop produces spare and component parts of varying sizes. Over-all scheduling is done by data-processing equipment. But the pegboard enables the foreman of the machine shop to keep track of work in-process.

Reprints of the Plant Operating Case Book are available. Price 50¢. For quantity prices write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.

CASE BOOK CAPSULES

Color photographs for identification badges are used at the headquarters of the Atomic Energy Commission in suburban Germantown, Md., for better security, simplicity, and morale.

New electronic "question and answer" system will monitor and control a vast oil field operation for Standard Oil of California Western Operations, Inc. (Vernal, Utah). Will minimize man-hours and solve accuracy problems by using digital-data-transmission and remote control concept.

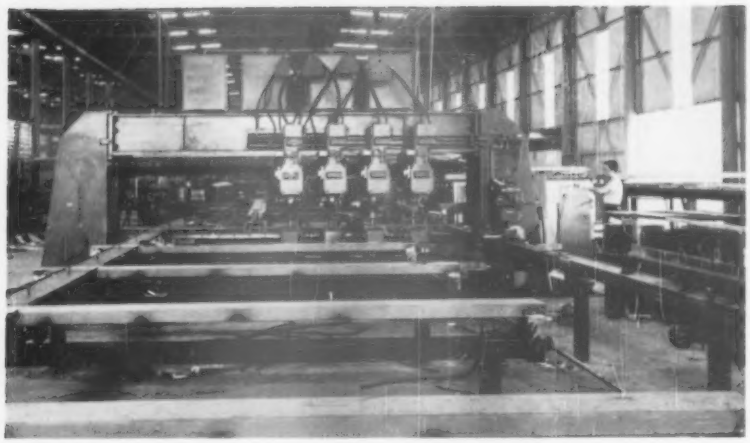
Dynapak is a new line of metalworking machine tools recently introduced by Convair Division of General Dynamics Corporation, San Diego. Uses a long-known law of pneumatics to forge, form, extrude, compact, shear, and blank metals and other materials.

Programing packaging with an IBM 704 electronic computer lets the Rocketdyne Division of North American Aviation (Canoga Park, Calif.) determine the minimum number of panel sizes required for a large variety of boxes.

A motor "so hot it glows" can operate successfully if built for it, according to Westinghouse Electric Company engineers (East Pittsburgh). New "fired on" insulating system allows conventionally wound motors to withstand temperatures above 1000 F.

Super-vacuum insulations—up to 26 times more efficient—enable Linde Company, Division of Union Carbide Corporation (New York), to store liquid oxygen for an indefinite period.

Automatic library of the future, demonstrated recently by International Business Machines Corporation (New York), will automatically read, summarize, code, distribute and file vast quantities of data by machine. This will solve the growing communications problem that business, industry, and science are all facing today.



HUGE RIVETER SPEEDS ASSEMBLY

This giant riveter rams home 6000 rivets per hour at Dorsey Trailers, Inc. (Elba, Ala.). The new machine is a first cousin of the riveters used by aircraft manufacturers. Electronically controlled, it is much less noisy than the 40 pounding rivet guns it replaces, because it squeezes the rivets into place. This makes for tighter seals, quicker work. This Drivmatic riveter took Dorsey engineers (working with General Riveters, Inc.) two years to design and install. Cost almost a half-million dollars. But handles steel and aluminum with equal ease.

Best Sniffer Yet for Fire, Smoke, Gas

An ultraviolet-sensitive tube developed by Minneapolis-Honeywell Regulator Company (Minneapolis) simultaneously detects fire, smoke, and combustible vapors. Said to be the first device designed to sense all three phenomena at the same time. The new tube is about the size of an index finger. With it, warning devices can be designed to operate faster and more accurately.

In a typical warning system the tube will work with an amplifier circuit to add up impulses of electrical energy generated by the tube as it counts ultraviolet rays. When these impulses exceed a specific rate, an alarm will be sounded, equipment turned off, and sprinklers started. The unit has an almost unlimited life expectancy and can be mass-produced economically. M-H has had one of the tubes under 24-hour test in a maximum on-off cycling operation for more than a year without decline in efficiency.

Photocopier Goes Where It's Needed

It's easy for anyone—even this miss—to carry the above 12-lb. duplicating machine where it's needed. Then all she does is plug it in, and it's ready to turn out up to four copies of a single sheet per minute. Cost per copy: about 8¢.

This portable feature especially appeals to the New England Overall Company (Boston). Here the Contoura-Matic performs a wide variety of jobs for many different departments. Makes clean, crisp copies of anything written, printed, or drawn in all colors (including red).

Measuring only 15 inches wide and 6 deep, the Contoura-Matic takes up no more desk space than a standard typewriter. And a plastic, snap-in cartridge containing pre-mixed developer eliminates messy handling of liquids. F. G. Ludwig, Inc. (Old Saybrook, Conn.), manufactures the Contoura-Matic.

Newest Slant on Scholarships

Newest demonstration of the common interests of employees and stockholders is the scholarship program of Merritt-Chapman & Scott Corporation (New York). Under it, two children of employees and two of shareholders get four-year help for their education. Scholarships are granted on a competitive basis. Panel of educators reviews applicant records. Selection program is handled by Educational Testing Service (Princeton, N.J.).

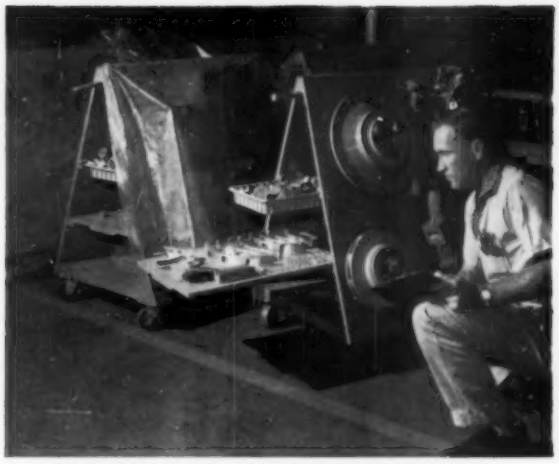
Winners get $1000 each year for the four years. The money may be used for any part of the student's academic expense. If the student elects to attend a college that is not tax-supported, an additional $1000 is donated to the college as an unrestricted grant-in-aid.

Prevents Rail Siding Accidents

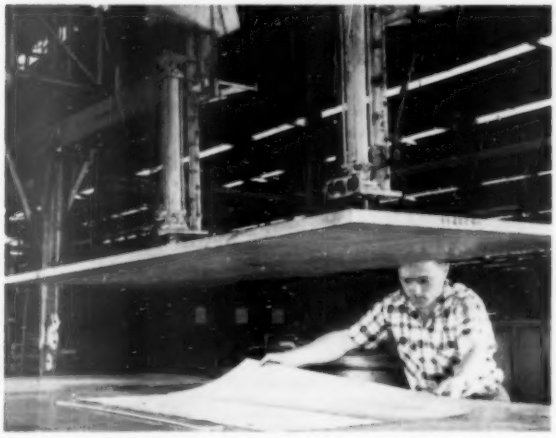
Sections of removable railing along the indoor railroad siding at Behr-Manning Company (Troy, N.Y.) promote safety for fork-lift operators as well as pedestrians. But they don't obstruct access to freight cars no matter where they're spotted along the platform. Reason is that any of the 44-in. sections can be removed in a jiffy.

Each section constructed of 2-in. steel pipe is light enough for one man to remove or replace. Sections fit in holes in the concrete loading dock and are interchangeable. They were designed by the Behr-Manning engineering department and built in the machine shops.

1. INSPECTION DOESN'T INTERRUPT.



2. CARTS GIVE MORE PARTS PROTECTION.



3. FASTER COOLING HOLDS TOLERANCE, TOO.

4. BETTER HANDLING SAVES STEPS.

Four Smart Ideas Chop Plant Costs

Here are four ideas for speeding production, protecting parts, maintaining precision tolerances, and eliminating wasted motions. They come from two divisions of North American Aviation, Inc.: two ideas are from Rocketdyne Division (Canoga Park, Calif.), two from Los Angeles Division. They may help you as much as North American.

1. Watering bulb (photo, top left) doesn't spray water. It sprays iron oxide powder over thrust-chamber butt welds at North American's Rocketdyne Division. The yoke creates a field across the weld; any interruptions in the field, caused by hidden fractures, attract iron oxide particles, thus clearly outlining the irregularity. Inspection method is fast, efficient, economical, can be accomplished without interrupting production. Old way involved removing each thrust chamber from the line for x-ray, then returning it.

2. Rocket turbopump parts get a damage-free ride through assembly stages on these newly designed carts at the Rocketdyne Division. Cart weighs only 75 pounds, has a 41-in. long, wooden A-frame with a 25-in. opening at the bottom.

Rig moves on metal casters and has two shelves. Larger shelf is made of wood and slides on a groove inside frame. Small one is plastic and has eight sections. This shelf alone can hold 100 small parts, while seven of the turbopump's larger components hang from the sides of the carts on metal pegs covered with plastic to prevent damage. Entire frame holds up to 150 pieces. Cost of frame in lots of 20 is $95.

3. Problem (at Los Angeles Division) was to cool flat and corrugated steel following heat treating before distortion set in. Answer was a 4x10-ft. aluminum plate that holds the steel flat and, at the same time, conducts heat away so fast the steel drops over 1300 degrees in a few minutes.

When the steel first comes from the heat-treat furnaces, it registers 1400 degrees. After it's placed on the slab and the aluminum plate is lowered, the steel drops to room temperature under the principle of heat transfer within four minutes. An air hoist lowers and raises the aluminum plate.

4. This conveyor system saves inspectors time and useless motion in handling incoming shipments that must be inspected before they can be

accepted. Inspectors used to move boxes one or more times manually after receipt at Los Angeles Division. But now a belt conveyor, with roller conveyor sections running from each inspection station, takes care of all moves. This lets parts go directly to storage with a minimum of handling by inspectors. The aisle the roller conveyors span isn't lost, either. Hinged roller conveyor sections swing back, thus permitting personnel to get through.

Two-Action Tool Cuts Handling

This operator deburrs holes in banjo differential housings without removing them from the conveyor at Chrysler Corporation's Lynch Road Plant (Detroit). Making this possible is a Burraway tool (Cogsdill Tool Products, Oak Park, Mich.). It deburrs both sides of holes by first working with its leading edge on the outside rim, then with its trailing edge on the inside rim.

The whole operation is done with only one pass, thus halving the motions of deburring. And there's no more non-productive unloading and loading of units on conveyors before and after deburring. This saves operator fatigue.

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear, concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.

Grass-Roots Problem Approach

Small companies, too, can tackle big issues. How? Through an employee seminar aimed at stimulating interest and discussion. Typical subjects: business climate and education, seasonal unemployment and unemployment compensation, and Rhode Island fiscal affairs. Company: Sealol Corporation (Providence).

The seminar was attended by 149 company employees plus 20 guests who observed the proceedings. Here plant workers and top management men sat down together to discuss agenda in free, no-holds-barred sessions. Seminar was held after working hours one Thursday evening with the company providing the dinner. A plant machinist chairmanned the event. (This same man also heads the shop council.)

How did Sealol organize the seminar? Here's a step-by-step rundown to guide you if you'd like to set up a similar program in your plant.

1. Employees were invited by letter to participate in the seminar. Sealol's president signed each invitation. Bulletin boards carried additional news of the meeting.

2. Research men and discussion leaders were appointed. Their job was to become experts on individual subjects, prepare reference material and facts needed for intelligent discussion and to answer any questions that arose. Many of the discussion leaders were shop workers.

3. Employees and guests were assigned to three discussion groups.

4. The evening of the seminar, program got under way at 4 p.m. After a 10-minute welcome by Sealol's president, seminar chairmen were introduced, then each topic up for discussion was summarized by an expert for roughly 10 minutes.

Next those participating broke up into discussion groups, spent 50 minutes on each of the three areas up for discussion with a one-hour break for dinner. Each employee participated in all discussion periods.

At 9:15 p.m. discussion leaders reported the feelings and decisions of their groups to the assembly. That way, everyone learned the reactions of every group in addition to his own. At 9:55, after a few brief closing remarks by the company president, the seminar broke up.

YOU BE THE ARBITRATOR

Continued from page 82

The award—In ruling in the company's favor the arbitrator called attention to the phrase: ". . . to aid and assist employees on the day shift." Temporary shutdown of a whole shift, he said, did not fall into this category. There was no evidence the transfer of men to the day shift was related in any way to a particular task that had to be done.

Caution: The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony, and other facts involved.

Oven Takes to the Roof

This rooftop structure saves valuable floor space for the Union Steel Products Company (Albion, Mich.). It houses the company's new baking oven. Building measures 65x25 feet. It's built of metal oven panels and has up to 6 inches of insulation on walls, floor, and ceiling. It's on 2-ft. stilts to protect the main building's roof from excess heat. Total cost: $26,000.

Oven building is completely conveyorized. Plated steel travels up from the production area, zigzags back and forth eight times in the oven, then returns to assembly. The 500 feet of conveyor runs at speeds from 10 to 20 fpm.

The gas oven itself can be heated up to 425 F., is constructed so no more than five panels will blow out in event of an explosion. The oven handles nickel, bright zinc, copper nickel chrome, and clear lacquer coatings.

POWER-UP!

calls for modern maintenance

SHOP REPAIR...

EFFICIENT—Modern repair craftsmanship plus modern facilities produce long-lasting electrical repairs to efficiently and economically cut your maintenance costs.

RENEWAL PARTS...

ECONOMICAL—You are assured modern materials properly engineered to fit your application.

FIELD SERVICE...

GUARANTEED—All modernized and rebuilt electrical equipment carries the same guarantee as new equipment. Fast service from a nation-wide network of plants provides prompt delivery. J-95200

YOU CAN BE SURE...IF IT'S Westinghouse

For more facts Circle 477 on Reader Service Card

FACTORY

IDEAS OF THE MONTH

By LEWIS K. URQUHART, Consulting Editor

(For more information, circle item numbers on Reader Service Card next to back cover)

Wash those bonding problems right out of your hair—with new adhesive *(Eastman Chemical Products).* It costs like sin, but a drop or two is enough to bond large surface areas—of almost any kind of material. Takes only minutes, sometimes seconds. No heat. No excessive pressure. **(291)**

Rollpin kit *(Elastic Stop Nut)* contains over 700 carbon-steel spring pins in a mix practical for machine shops, repair work, etc. All in a compartmented plastic box. In a wide variety of diameters and lengths. **(292)**

Mini-Module is the meaningful moniker used by the maker *(Jarke Mfg. Co.)* to identify those build-your-own storage racks. Can be set up or taken down by one man. In seconds. No bolts, no tools, no fittings. **(293)**

Add an R to Vapotester *(Davis Emergency Equipment)* and it turns out to be a pocket-sized checker of explosive vapors. For on-the-spot work. **(294)**

Punchcard lubrication system *(Aug., p. 96)* has now been supplemented by a motor lubrication record *(The Minute Co.).* Two cards at each motor keep the lubricating gang on the ball. **(295)**

Do-it-yourselfers will welcome a new transfer (or accumulating) table *(Standard Metal Products).* Self-powered. Variable speeds. **(296)**

If general lighting levels in your plant are still down around 50 to 60 foot-candles, a new booklet, "Lighting for Profit" *(G-E Large Lamp Dept.),* will supply you with any additional ammunition you may need to sell the boss on 100—or even 200—foot-candles. **(297)**

You can quieten equipment that exhausts air (and people) with inexpensive polyether foam mufflers *(Mead).* Little, but oh, my! **(298)**

Bearpaw is a "handle" *(Smith's Magnet Sales)* that will pick up 300 lb. or so. Secret: magnets embedded in Vibrin *(U. S. Rubber)* plastic. **(299)**

Collective bargainers who want to avoid sleeper clauses and booby traps in labor contracts will find help galore in new booklet *(NAM)* called "Check Points for Sound Bargaining"—itself a sound bargain at $1. **(300)**

Respirator wearers are sure to go for those new two-section filters *(American Optical).* Prefilter traps larger particles. Asbestos fibers in filter body vary in density from front to back, prevent rapid plugging with corresponding increase in breathing resistance. **(301)**

Good news for packers who have to stack and load corrugated shipping boxes: A new 16-page booklet *(Hinde & Dauch)* tells how to estimate storage space, distribute load weights, handle and identify boxes. Also describes use of gates, bulkheads, barricades, weatherstripping. **(302)**

Square-shaped cafeteria dishes *(Syracuse China)* take less storage room, less space on food carts. Small (10½x15-in.) tray holds as many pieces as a 16x22-in. tray holds of conventionally shaped dishes. **(303)**

No squinting with stopclocks *(Andrew Technical Supply)*. They operate and read just like stopwatches. But dials are 4 to 8 in. in diameter, so quick readings can be accurately taken at a distance. **(304)**

Do's and Don't's for safe grinding—all in a 24-page brochure *(Grinding Wheel Institute)* that also discusses, in layman's language, maximum peripheral speeds, definitions of maximum speeds, effect of wheel speed on grinding action, safety guards, mounting procedures, etc. **(305)**

A steel building might cure your growing pains. And a handsome new booklet *(Armco)* in full color may give you ideas. **(306)**

Guardtex is a green (safety-colored) self-adhering tape *(General Bandages)* that cuts accident losses by protecting fingers and hands against cuts, burns, abrasions. Leaves no sticky residue or color stain. **(307)**

Pigeon trouble? Harmless compound *(Bird-Free Co.)* contains something birds won't stand on. Doesn't freeze in winter, run in summer. **(308)**

Booklet of the Month: If you think aluminum outdoor telephone booths *(Alcoa)* don't belong on your plant grounds, a new brochure full of fun and facts is likely to change your viewpoint. **(309)**

Thermal-Raye is for loading platforms, other plant cold spots. It's a new heater *(Thermal-Aire)* that looks like a fluorescent lighting fixture, heats its target with infra-red rays, same way the sun does. **(310)**

Snowplow, anyone? Take a look at Bobcat *(Whitman & Robinson)*, a 4-wheel drive tractor specially designed for sidewalks. And at Yardmaster *(Porter Cable)*, a versatile power unit that will double (come spring) at grading, seeding, rolling, mulching, hauling, gang mowing. **(311)**

More Ideas of the Month in Press Time Report following page 34

FACTORY EQUIPMENT NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

PRECOATED STICKY FLAPS MAKE UP INTO. . .

Self-Stick Corrugated Boxes

Now corrugated boxes can be stored flat until needed, then can be quickly set up and sealed by the same workers who fill them. Precoated self-stick flaps are quickly sealed by hand pressure on boxes treated with new "Stik-Kwik" latex-base coating. The coating sticks only to like coating—not to untreated box areas, hands, or clothing. Matching coated areas (dyed black in the photo for visibility) stick tightly together on contact. The container shown is sealed bottom and top by this method—no stitching, taping or gluing equipment needed.

The process can be used in a variety of packaging applications—saving space, equipment, and labor. The bond formed by the coating has high shear and tensile strength, but the box can be opened by hand.

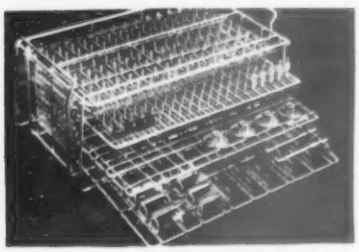
Stone Container Corp. (Circle 101, Reader Service Card.)

102—Small Package Transformers simplify electrical distribution systems in plants, add economy and safety. These units, bolted to machine tools and equipment, convert —on-the-spot—220 or 440 voltage to provide plug-in 110 voltage wherever needed. *Mullenbach Div.*

103—Midget V-Belt Drives feature smaller and lighter sheaves and V-belts of higher capacity. With new "Dyna-V" line, industrial drives up to 50 hp. can be handled with ⅜-in.-wide belts, and higher hp. drives (up to 200 hp.) with ⅝-in. belts. *Dodge Mfg. Corp.*

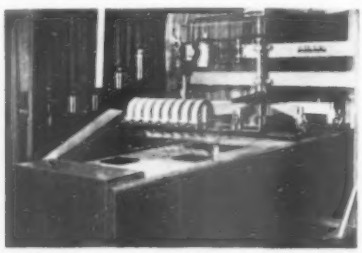
104—Package System for cleaning all makes of electronic precipitators uses "DAX" detergent-adhesive solution. When mixed with wash water, double-acting "DAX" washes the collecting cells, then dries and leaves an adhesive coating. *Electro-Air Cleaner Co., Inc.*

105—Table-Veyor is a work bench with a built-in materials flow line. Available in lengths from 5 to 60 ft., and with belts from 4- to 24-in. wide, the units adjust for varied assembly, inspection, checking, sorting, and testing operations. *Rapids-Standard Co., Inc.*



106—Wire Baskets for handling precision parts have wire shelves or trays that may be removed from the sides. Individual parts loaded on the sliding shelves are protected during handling. Two sizes: 13⅜x21x8 and 11¾x18x8½ in. *Mid-West Wire Products Co.*

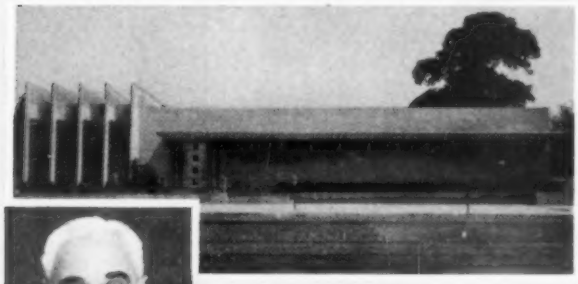
107—Midget Mufflers are compact, durable, economical. Polyether foam enclosed in aluminum provides an excellent silencer for exhaust air noises from pneumatic devices. Model shown, mounted flush to ⅛- or ¼-in. exhaust port, protrudes only ¾ in. *Mead Specialties Co.*



108—"Memory Timer" Control units, simple to install on any rotary or reciprocating spray machine, will actuate the individual spray guns only when there is surface to be sprayed. Result is a big reduction in overspray and in material loss. *Binks Mfg. Co.*

Turn the page

New Engineered Maintenance procedures help Aetna Finance organize and control cleaning chores



"Now our sanitary maintenance program runs itself

...and we've saved 25 per cent on labor...15 per cent on materials ...50 per cent on supervision...10 per cent on building depreciation."

These are the actual sanitary maintenance economies reported by Aetna Finance Company after thorough testing of Puritan Chemical's new ENGINEERED MAINTENANCE system of plant and office housekeeping.

Aetna tried ENGINEERED MAINTENANCE in its new St. Louis headquarters building, using its own janitors and porters. "ENGINEERED MAINTENANCE made our work easier," says David R. Corwin, Aetna Secretary-Treasurer. "It's taken the pressure off our supervisors and janitorial crew."

Available without charge

ENGINEERED MAINTENANCE is a complete, individually planned program which any user of Puritan sanitary maintenance products may request. It applies tested systems and engineering techniques to the specific sanitary maintenance requirements of your plant. It organizes your custodians' work on an engineering basis—sets up automatic controls—provides for systematic follow-through and review.

Gives you more time

Puritan's ENGINEERED MAINTENANCE helps free you of petty sanitary maintenance details, and makes your janitors more efficient and dependable.

Even top management now is becoming more interested in efficient sanitary maintenance. It must protect its increased investment in plant, equipment and higher over-all labor costs.

Streamlines a "problem" operation

Because of the human element... relatively unskilled and unsystematic personnel...sanitary maintenance can make heavy inroads on your time. ENGINEERED MAINTENANCE helps you get the job done thoroughly and economically. It enables you to chart for management all the continuing detail involved, and to lay out a plan of operation.

No cost—and no strings

As a user of Puritan sanitary maintenance products, you can have a Program engineered to your individual needs... free.

You do not pay a premium of any kind for a Puritan ENGINEERED MAINTENANCE Program. You are not involved in any long-term contract.

Puritan products are nationally used, competitively priced, fully guaranteed. The burden of proof is upon us.

New technical brochure

Write for "ENGINEERED MAINTENANCE." This new brochure gives you the details you want. It shows you a way towards simplified and trouble-free sanitary maintenance operations in your plant.

PURITAN CHEMICAL COMPANY

EXECUTIVE OFFICES: 916 ASHBY STREET, N. W. • ATLANTA 18, GEORGIA

PLANTS: ATLANTA, GEORGIA • HOUSTON, TEXAS • ST. LOUIS, MISSOURI

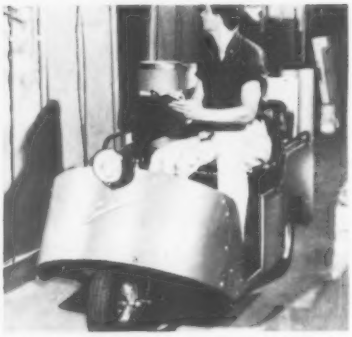
For more facts Circle 478 on Reader Service Card

For more about these items, circle numbers on Reader Service Card next to back cover.

OUTSIDE THE PLANT . . .

OR INSIDE IT . . .

FOR HEAVY DUTY . . .



OR LIGHT HAULING . . .

Here Are Four Smart New Trucks

Gasoline-powered Truckster Model 780 (upper left) is "beefed up" to handle 800-lb. payloads at an operating cost under a penny a mile. This new 1959 model has automotive-type clutch, transmission, and differential; speeds up to 50 mph.; comes in many body styles.

Three new Electric Trucksters range from a single passenger machine with 2-cu.-ft. carrier space (Model 730, upper right) to the heavy-duty Model 734 (lower left), which can handle a 1000-lb. payload plus operator and passenger and can travel up to 50 miles without recharging batteries. Rounding out line is two-passenger Model 731 (lower right) with ¼-ton payload. *Cushman Motors* (Circle 109)

New Aerial Cable Spacer System

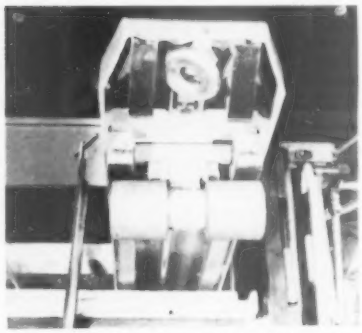
Plastic Spacer (left) is a feature of new overhead distribution system suitable for economical installation in cramped spaces. Single-size spacer is used for all voltages up to 15 kv., providing 6-in. spacing between phase conductors. Spacers are about 30 ft. apart along length of system. Top slot is for messenger-ground cable. Hard-drawn aluminum conductors with polyethylene insulation are standard.

Rome Cable Corp. (Circle 110)

111—Electronic Counter is reliable yet low-priced (about $300). Uses no tubes, is very stable. Can be battery-operated, and is hermetically sealed. Predetermining type shuts off (or on) another circuit when pre-set count is reached; counts up to 500/sec. *The Redford Corp.*

112—Spiral-Shaped Rubber Idler adapts to any type belt conveyor to handle chemicals, aggregates, cement, and other bulk materials. Flexible idler boasts self-cleaning action. Available for belt widths 18 to 36 in., priced around $35 to $45. *Hewitt-Robins, Inc.*

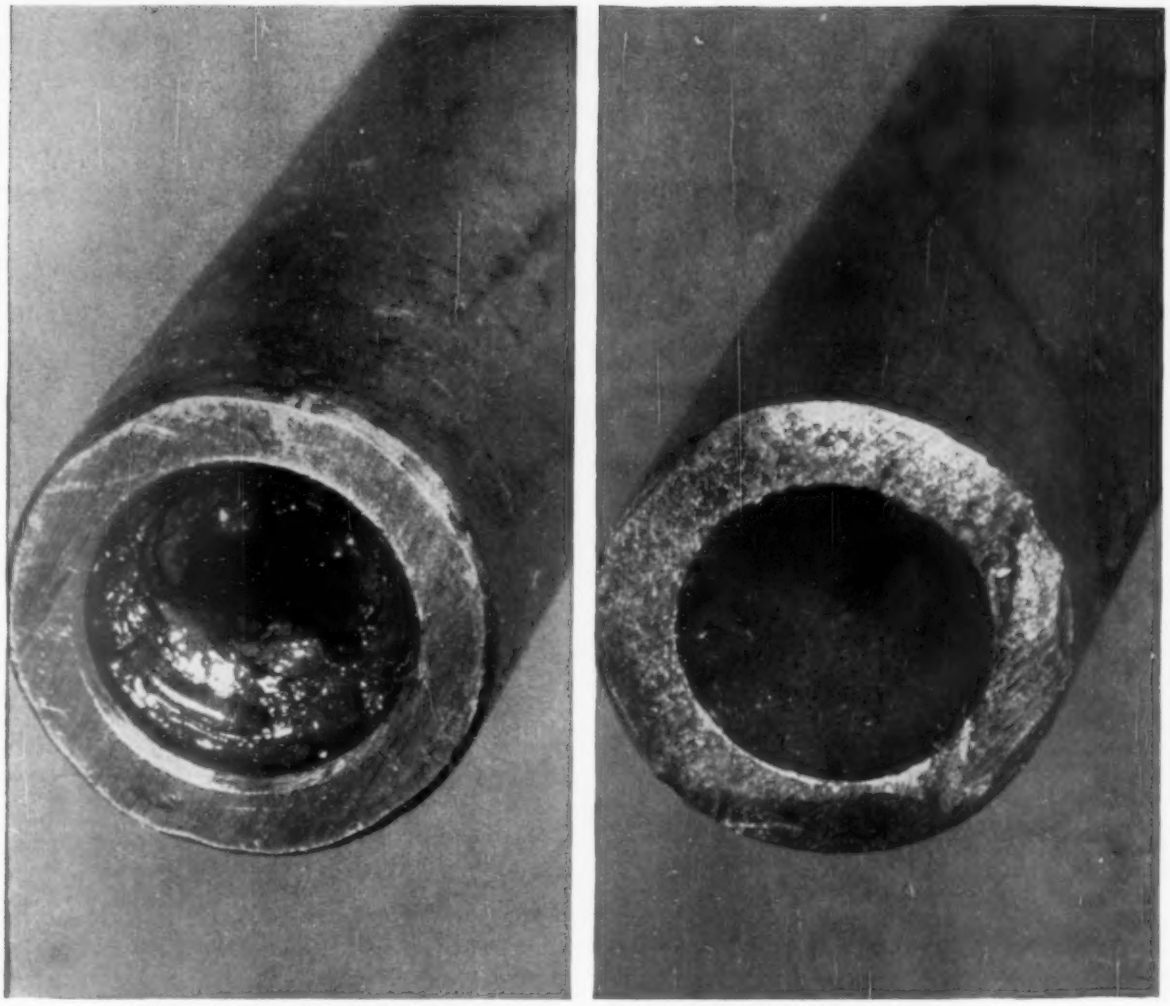
113—Industrial X-Ray Unit is designed to speed up inspection of equipment and products for flaws. Unit uses electronic equipment to amplify an x-ray image several hundred times brighter than a fluoroscope image and transfer it to a TV screen. *Picker X-Ray Corp.*



114—"Flying Saucer" Pallet Entry device (shown upended) makes it easy for pallet forks to enter pallet. Disk, on maker's new low-lift trucks, gives the effect of 3 added inches of roller diameter to ease climb of fork over bottom pallet board. *Barrett-Cravens Co.*

115—Variable-Speed Pulleys (rated 2, 3, 5, 10, and 15 hp.) incorporate new design that eliminates fretting corrosion as well as freezing and sticking. Bearing surfaces are re-oiled from an oil reservoir with each rotation of the pulley. *T. B. Wood's Sons Co.*

Turn the page



This sludge-clogged hydraulic line . . . looked like this, after cleaning with a Sunvis 700 oil.

With Sunvis 700 oils, you can clean hydraulic systems and keep them clean

Sludge, caused by high temperatures, and by water, dirt, cutting oils, paint, packing, and by many other contaminants, clogs lines and cuts efficiency.

Sunvis* 700 oils keep these contaminants in suspension, and carry them away to the filters, thereby keeping systems clean and preventing costly shutdowns. In fact, many seriously fouled systems can be cleaned and kept clean permanently by a switch to Sunvis 700 oil. A single charge of Sunvis 700 oil can keep even a continuously contaminated system running smoothly for months, often *years*.

Your Sun man knows Sunvis 700 oils inside out. He has facts, figures, and case histories that prove their quality . . . quality that means *money in your pocket*. Call him in soon. Or write to Dept. F-1.

Industrial Products Department

SUN OIL COMPANY, Phila. 3, Pa.

SUNOCO

*TRADEMARK

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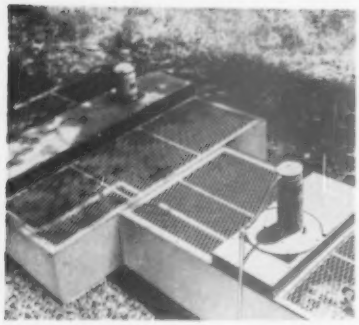
In Canada: Sun Oil Company Limited, Toronto and Montreal

For more about these items, circle numbers on Reader Service Card next to back cover.



116—Package Sewage Treatment plant for small installations comes in two factory-built models, with capacities to 7500 gal./day. Smaller size aerator model can serve a plant of 85 employees if showers are installed—of 105 employees without showers. *Yeomans Brothers Co.*

117—Crane and Hoist Drive, operating on all-standard-voltage, 3-phase, a-c power supplies, automatically adjusts speed to load. New constant-hp. drive offers wide speed range; adjusts speeds to amount of weight on lift hook. *Reliance Electric & Engineering Co.*

118—Flexible Gear Coupling with a one-piece nylon sleeve is non-lubricated, flangeless, lightweight (only 3½ lb.). "Nyflex" operates over a wide temperature range at speeds up to 5000 rpm. Comes in 10 bore sizes, up to 1⅝ in. *Sier-Bath Gear & Pump Co., Inc.*

119—"Mini-Ram" is a rugged, air-operated pressure primer. It's used with air-operated pumps to dispense heavy lubricants, putties, mastics, sealers, and coatings direct from original 5-gal., 25- to 50-lb. containers. System is sealed from dirt. *Lincoln Engineering Co.*

120—Gas Control Unit is a push-button device that regulates the flow of oxygen and fuel gas in welding and cutting operations. Unit promises money and time savings through faster starts, reduced gas consumption, and improved work quality. *Smith Welding Equipment Corp.*

121—Bearing Lubricator Tool solves the problem of greasing a wide variety of frictionless, sealed ball bearings in industrial use. Two models available are recommended for lubricating bearings having from 0.375 to 1.0625 in. ID and ¾- to 2-in. OD. *P-G Corp.*

122—"Carquake" is a hydraulically powered, one-man-operated car shaker that efficiently unloads hopper-bottom railroad cars with minimum noise. Two models, stationary-mounted and rail-mounted, are furnished as complete package units. *Stephens-Adamson Mfg. Co.*

123—Three Fastening Devices useful for electrical construction are: a rod hanger clamp (used to hang fluorescent fixtures and duct); a channel clamp (to fasten runner channels to hanger rods); and a wire conduit clamp (for anchoring conduit). *Geo. A. Tinnerman Corp.*

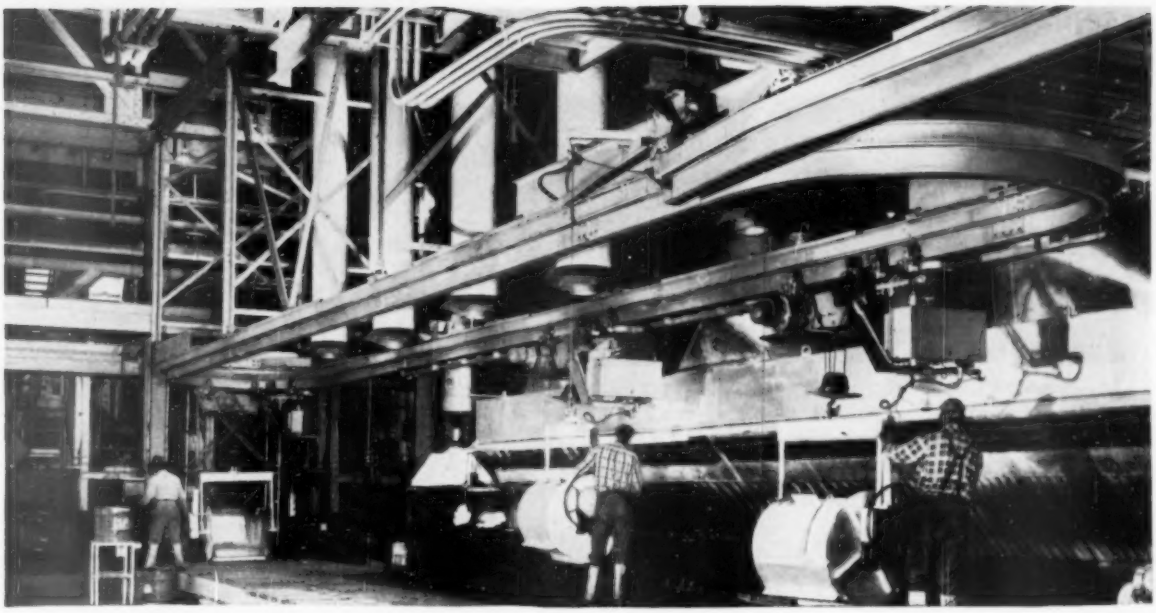
124—Three New Plant Fire Alarm systems: a master code, closed circuit, supervised type; a non-code, closed circuit, supervised model; and a non-code, open circuit, non-supervised unit. Each has contact capacity of 3 amp. at 120 v. a-c. *Cincinnati Time Recorder Co.*

"Soup-To-Cig" Service

A complete soup-to-smokes, coin-operated automatic cafeteria, quickly installed in any plant, can serve a full light lunch—including hot foods and refrigerated desserts—24 hours around the clock. The new "Roweboteria" consists of matched vending machines that fit flush to form a single unit, with "showcase" fronts displaying the products. No attendants are needed (the coffee vendor unit can even turn itself off on Friday nights and on again Monday mornings).

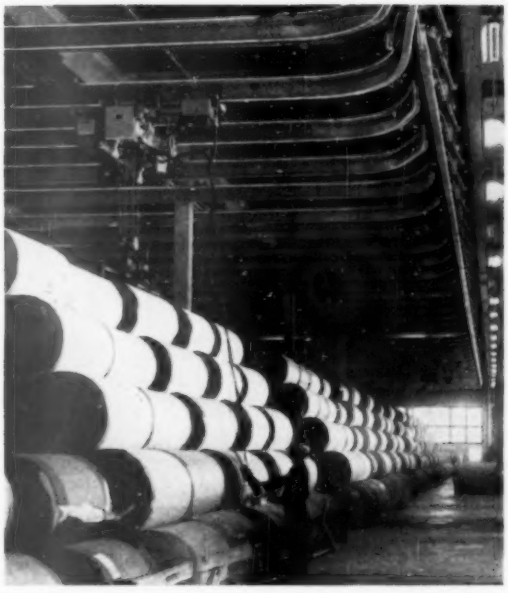
Rowe Mfg. Co. (Circle 125)

Turn the page



Here's a way to make your lost ceiling space pay off

AMERICAN MONORAIL



Floor space is unobstructed, free of traffic with American MonoRail overhead handling.

increases plant capacity... cuts handling costs... reduces worker fatigue... minimizes damage and loss.

You can get more profit out of your plant. American MonoRail Engineers can show you how to convert lost ceiling space – eliminate obstructive storage around machines – and gain additional operating area. Find out how you can process work in motion, cut down idle time, and assure safe handling of product. Work can be done at comfortable heights – worker fatigue lessened – heavy loads eliminated – and damage to product reduced.

Let American MonoRail Engineers plan your handling. Write for full information today.

AMERICAN MONORAIL

ENGINEERED MATERIALS HANDLING

13144 ATHENS AVENUE
CLEVELAND 7, OHIO

OVERHEAD HANDLING EQUIPMENT

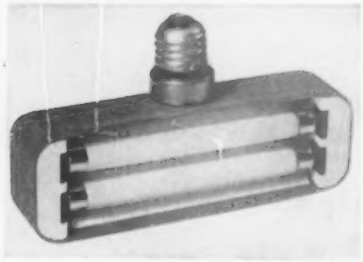
MEMBER OF MATERIALS HANDLING INSTITUTE AND MONORAIL MANUFACTURERS ASSOCIATION

For more about these items, circle numbers on Reader Service Card next to back cover.

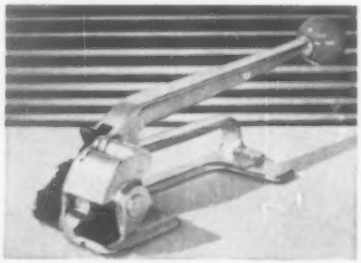
126—Sander-Plane Tool, for filing, sanding, planing, beveling, cuts in half time required to remove material from wood, plaster, plastics. Tool cuts on both forward and back strokes. Abrasive surface is tungsten carbide grits, copper-bonded to steel blade. *Skil Corp.*

127—Transistorized Gages offer four magnifications, at flick of a switch. Rugged gages measure optionally in thousandths, ten-thousandths, or millionths. Accuracy of readings is unaffected by normal voltage and frequency fluctuations. *Pratt & Whitney Co., Inc.*

128—Automatic Eraser, working on a single standard flashlight battery, is said to "erase without trace" and without injuring writing surface. Comes with four erasing tips to erase typing, ink, pencil, crayon; and two cleaning brush attachments. *B. Altman Products.*



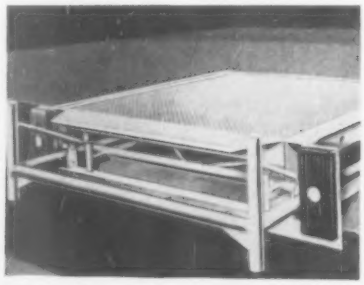
129—Fluorescent "Screw-In Bulb" enables anyone to convert quickly a hot incandescent lamp to a cool fluorescent fixture. Provides five times the illumination of incandescent lamps over work benches, machines. Three models, 115 v. a-c. *Herbach & Rademan, Inc.*



130—Manual Strapping Tool is a light but sturdy tightening tool for tensioning steel strapping. Used to apply strapping to packages of varying shapes and weights, it will strap in any direction, using either hand; requires fewer strokes. *The Stanley Steel Strapping Div.*

131—"Spacemite" Drill Motor, easy to handle, permits hand drilling of holes within ¼ in. of obstructions and within $\frac{9}{32}$-in. radius in 90-deg. corners. It accommodates standard aircraft threaded shank drills through ¼-in. dia. *Winslow Product Engineering Corp.*

132—Pre-set Snap Torque Wrench employs a replaceable standard socket key, pre-set to user's specs by maker, then sealed and marked for specified applications. Worker simply tightens tool until distinct snap is heard and felt. No dials to read. *Skidmore Engineering Co.*

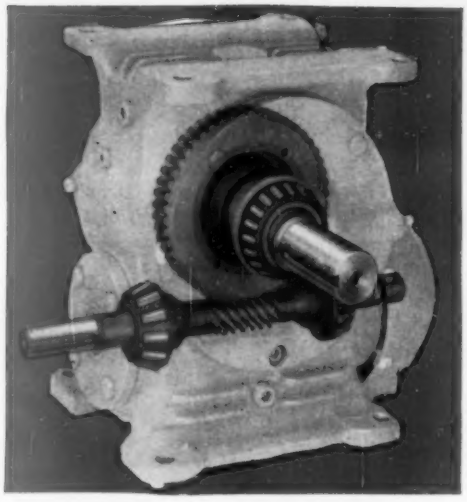


133—Hinged Loading Ramp is a fully automatic, truck-activated ramp that can be set into a pit less than 18 in. deep in a loading dock or, in one of three free-standing models, can be placed in front of dock. Lengths: 6, 8, 10 ft.; width: 6 ft. *American Dockbridge, Inc.*

134—Heavy-Duty Pressure Probe welds thermocouples, honeycomb sections, electronic assemblies. Handpiece consists of welding lead with pressure-sensing mechanism, and separate ground lead. Probe fires at pre-set pressures to 25 lb. *Weldmatic Div., Unitek Corp.*

Turn the page

NEW LINK-BELT
UNIVERSAL
worm gear speed reducers



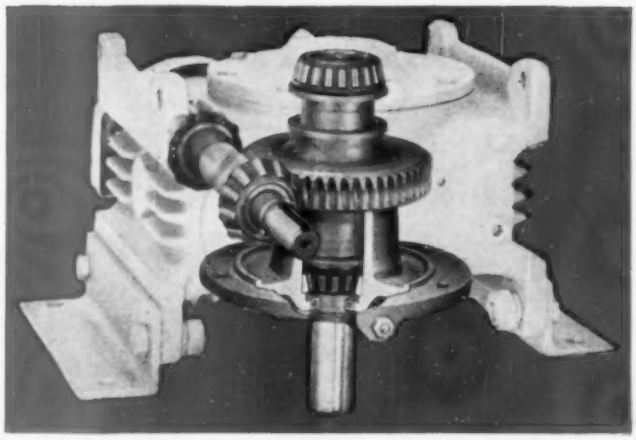
- *three mounting positions*
- *more hp per pound, per dollar*
- *available from stock*

IN *all* ways, Link-Belt's new *Universal* sets the pace among worm gear speed reducers. Its simple, compact design offers more usable hp in a smaller housing . . . holds down initial cost . . . minimizes mounting space. And with simple changes of oil gauge and breather, the *Universal's* versatile housing can be mounted in positions B, T, and V as shown.

The *Universal's* mounting versatility is matched by its performance versatility. It permits operation at high input speeds with fractional or large hp motors, provides moderate or slow output speeds with ample capacity for heavy loads, assures smooth transmission of power at right angles with high efficiency and minimum maintenance.

MOUNTING B — worm shaft below gear.

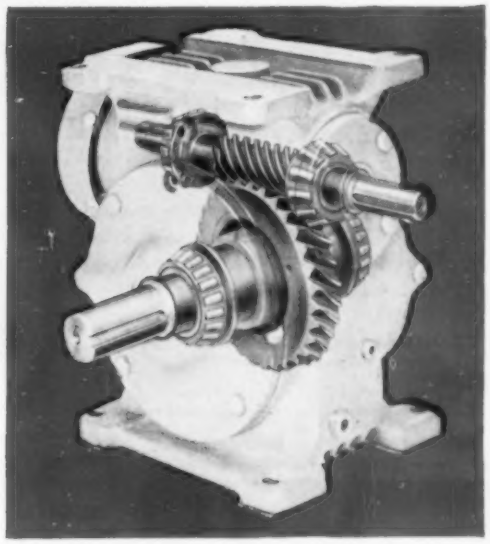
Universal worm gear speed reducers available in 2½, 3, 3½ and 4 inch centers with ratios of from 5⅓ to 60 to 1. For details, call your Link-Belt office or authorized stock-carrying distributor—see *SPEED REDUCERS* in the yellow pages of your phone directory. Or write for Folder 2724.



MOUNTING V — Output shaft vertical—upward or downward.

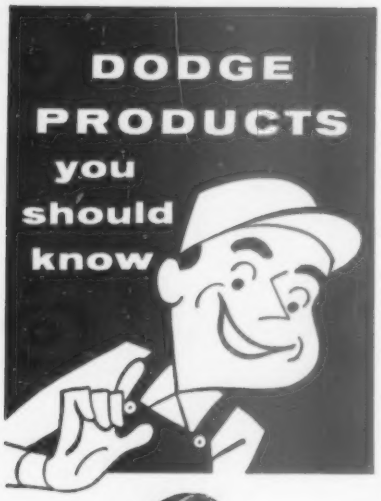
LINK-BELT

SPEED REDUCERS

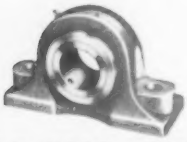


MOUNTING T — worm shaft on top of gear.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,018



TORQUE-ARM
SPEED REDUCERS
Cost less—deliver more!



SC AND SCM
BALL BEARING PILLOW BLOCKS
"The seal won't blow!"

TAPER-LOCK
SPROCKETS
No reboring—no waiting!

●

Write for Bulletins!

- Torque-Arm Speed Reducers. 15 sizes—1 to 100 hp. Bulletin A-637
- Rolling Bearings—Ball and Timken Tapered Roller. Bulletin A-638
- Taper-Lock Sprocket and Dodge Roller Chain data. Bulletin A-644

DODGE MANUFACTURING CORPORATION
400 Union Street • Mishawaka, Indiana

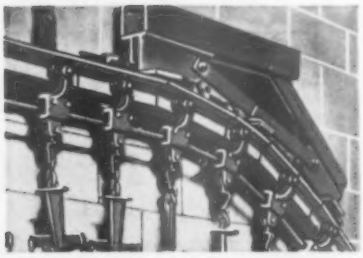
DODGE
of Mishawaka, Ind.

For more about these items, circle numbers on Reader Service Card next to back cover.

135—"Golden Thief" is a sample-stealing new vacuum pump. Unit obtains pure samples of liquids and some powdered solids from tanks and drums by drawing the materials into laboratory bottles or cans. Various sizes are available; aluminum, brass, or stainless. *W & W Mfg. Co.*

136—Four-Wheel Trolley is particularly useful for moving materials weighing up to 500 lb. over short distances. Features such as manual operation, straight track, horizontal bends, and sturdy side plates permit wide use for short hauls. *Rapistan-Keystone, Inc.*

137—Emergency Oxygen Kit that can be dropped or heated without danger is a dandy item to have in any plant or vehicle. Can be used by inexperienced personnel—simply slip on face mask and twist knob a quarter-turn to start oxygen flow at proper rate. *Emergox, Inc.*



138—Overhead Cable Conveyor changes elevation while in operation. With flexible "Limber-Dip" sections of monorail, whole sections of the conveyor may be raised or lowered while moving items are being processed. *Dearborn Fabricating and Engineering Co.*

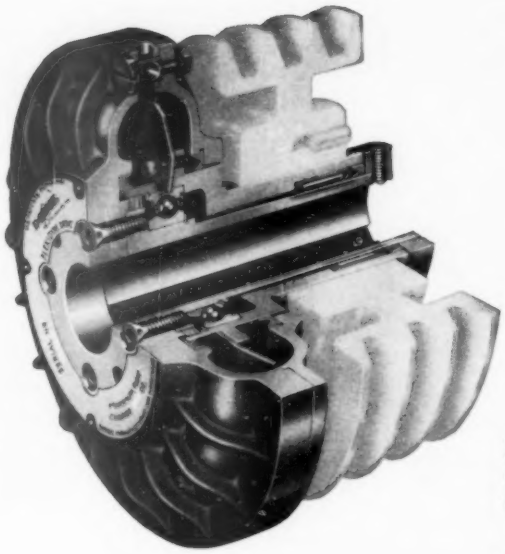
139—Collapsible Containers are sturdy and economical. They're made of $\frac{3}{16}$x$\frac{5}{8}$ in. steel bars running vertically and 5-gage wire rods running horizontally on the inner edge of bars, all resistance-welded on 3-in. centers for added strength. *Fleetwood-Airflow, Inc.*

140—Magnetic Handle known as "Bearpaw" gives metal workers a lift with metal loads weighing 300 lb. or more. New tool gets its holding strength from powerful magnets embedded in tough plastic. It weighs 5 lb., needs no electric power. *Smith's Magnetic Sales Co.*

Turn the page

WHAT'S YOUR PROBLEM?...

- ☑ Overheated motors?
- ☑ Excessive belt maintenance?
- ☑ Breakage of materials being processed —like thread, wire, paper?
- ☑ Expense of oversize or high torque motors?
- ☑ High demand rate?
- ☑ Expense of reduced voltage starters?
- ☑ Clutch trouble?
- ☑ Breakage of transmission parts due to instantaneous shock loads?
- ☑ Damage and recurring down-time from overloads?



FLEXIDYNE

THE DRY FLUID DRIVE

It is no longer necessary to accept the destructiveness—the costliness—of conventional starting in the mechanical transmission of power. Flexidyne changes that!

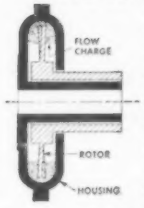
Flexidyne is the new way to start loads *smoothly*—to protect against shock and overload—to save power—all *without any sacrifice of efficiency at full load!*

This revolutionary development is ushering in "the day of the soft start"—which can mean thousands of dollars to you in equipment savings and in better, more economical operation.

Flexidyne is available, off the shelf, in Drives and Couplings. Capacities range from fractional to 1,000 hp. Ask your local Dodge Distributor or write us for technical bulletin.

DODGE MANUFACTURING CORPORATION, 400 Union St., Mishawaka, Ind.

HOW FLEXIDYNE WORKS



The "dry fluid" in Flexidyne is tiny heat-treated steel shot. A measured amount, called the "flow charge," is contained in the housing, which is keyed to the motor shaft. Inside the housing is a rotor, free to revolve relative to the housing, but connected to the load.

When the motor is started, centrifugal force throws the flow charge to the perimeter of the housing, packing it between the housing and the rotor, which transmits power to the load. Initial slippage is momentary. Housing and rotor become locked together and achieve full load speed without slip and at 100% efficiency.

CALL THE TRANSMISSIONEER — your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look in the *white* pages of your telephone directory for "Dodge Transmissioneer."

DODGE

of Mishawaka, Ind.

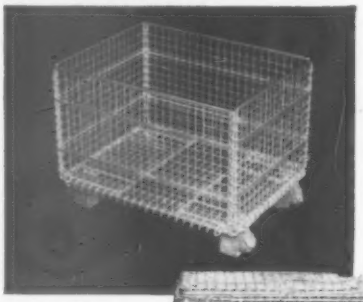
the Answer .... to your small parts Handling–Storage–Transport PALLETAINER®

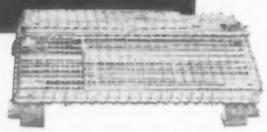
the NEW 'Junior'

● Close-mesh, all-steel containers with fold-down features ● Ideal for *all* small parts handling—storage—transport

● The new lightweight Palletainer 'Junior' models are sturdy, close-meshed, all-steel containers designed for efficient handling, storage, protection and safe transit of any small parts—assembled or finished products. Ruggedly built of reinforced welded steel wire mesh, the 'Juniors' incorporate many of the outstanding construction and convenience features found only on large, heavy-duty containers. Check your plant today—see how many places the 'Junior' models could smooth production, speed processing, deliveries and save valuable handling time.

'Junior' Model No. 3220—500 lb. capacity. All welded steel wire mesh, reinforced. 32" long by 20" wide and 16" high. Mesh openings are 1½" square. Equipped with 4 fabricated steel stacking legs welded to deck bottom. Finished in fire-baked Aluminum paint. Weight 38 lbs.





'Junior' Model No. 2016—200 lb. capacity. 20" long by 16" wide and 12" high. All welded steel wire mesh. 1½" square mesh openings. Four fabricated steel stacking legs. Lossproof side locks. Aluminum painted. Weight 25 lbs.

'Junior' Palletainers fold down quickly and easily to save over 75% of their open area. Saves storage space, makes handling easier and lowers return shipping costs.

If you handle or process small parts . . . you need Palletainer 'Juniors'!

Try these tested, proved-in-service containers for all types of parts handling. They'll actually pay for themselves in handling savings. Write today for complete information, prices and delivery dates.

Palletainers are manufactured exclusively by

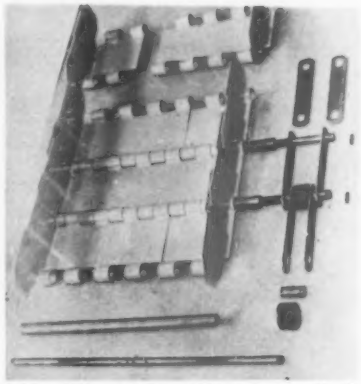
UNION STEEL PRODUCTS CO.

515 N. Berrien St., Albion, Michigan

MANUFACTURING PLANTS ALSO IN COMPTON, CALIF. AND WATERLOO, QUEBEC, CANADA

Begins on page 90

For more about these items, circle item numbers on Reader Service Card next to back cover.



141—Hinged-Pan Conveyor eliminates scrap clogging and spilling; close-fitted pan joints leave no opening during movement for sharp-edged scrap to wedge in. Each self-contained unit consists of head and tail shaft assembly mounted on steel framework. *Gifford-Wood Co.*

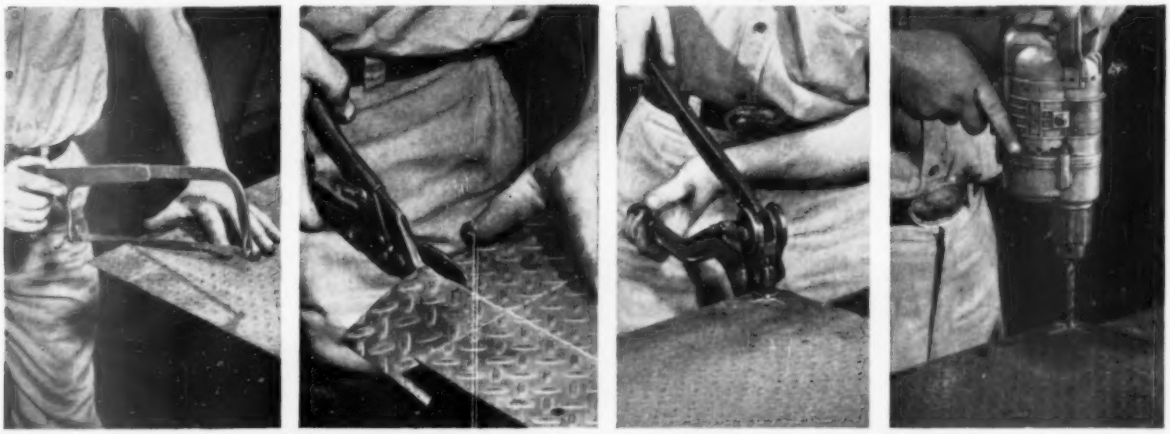
142—Canvas Tote Baskets are light, sturdy, easy to carry and store in small space (they nest without sticking). Two sizes: 17x10x7 in. (weighs 18 oz.) and 20x12x8¾ in. (24 oz.). Come in various colors, for ready identification. *Handy Folding Pail Co., Inc.*

143—Volt/Ohm. Milliammeter is a rugged thin-line model for a wide test range—d-c to 4000 volts at 20,000 ohms/volt, a-c to 1600 volts at 1000 ohms/volt. Unit is protected against magnetic disturbances; fused ohmmeter circuits prevent burnout. *Daystrom, Inc.*

Turn the page

ORDINARY SHOP TOOLS

can cut, bend, hammer, drill, shape, roll saw, snip



SMALL PATTERN INLAND 4-WAY® SAFETY PLATE

You don't have to spend a penny for special equipment. With just the normal tools available in your plant you can work with Small Pattern Inland 4-WAY SAFETY PLATE—use it for dozens of maintenance jobs.

Small Pattern 4-WAY SAFETY PLATE is only 18 gage, weighs only 2.4 pounds per square foot, yet has all the slip-resistant traction and safety features that has made regular 4-WAY SAFETY PLATE famous. Small Pattern 4-WAY costs less to use—less per square foot covered—than other similar materials.

It's tough, rugged, built for years of wear, yet it is light and flexible enough to carry wherever needed—work into any required form. Try it. It's firesafe, non-absorptive, easy to keep clean—the ideal material for fast, easy, low-cost maintenance use.

a few of the ways you can use light gage Safety Plate:

kick plates
tool racks
wall covering
treads on wood steps
round or square column protectors
thresholds
truck beds
resurfacing
machines tool tables
covering over worn cement stairs

AVAILABLE FROM YOUR STEEL SERVICE CENTER in 18 gage, cut to your needs in widths up to 42″ and lengths up to 152″.

AMERICAN STEEL WAREHOUSE ASS'N.

INLAND

4-WAY SAFETY PLATE
®Registered U. S. trademark

INLAND STEEL COMPANY
30 West Monroe Street, Chicago 3, Illinois

For more facts Circle 485 on Reader Service Card

Let These Four GOODALL *Products Prove Their Cost-Saving Quality*

Because they are made to meet Goodall's high standards for materials, workmanship and service performance, the products shown below will demonstrate for *you* the quality and economy which have established their reputations in many other plants.

"ALL-SERV" GENERAL-PURPOSE HOSE

The one hose for a wide variety of applications ... air, water, oil, gasoline, paint spray, grease gun, etc. Buy it in long lengths ... cut and couple it as required ... to keep hose inventory down. Molded-and-braided, all "Synplastic"® construction, with tough, wear-resistant cover. Extremely flexible. Sizes ¾" to 1½"; one, two and three braids; maximum lengths of 500 feet. Working pressures to 300 lbs.

"POWER KING" V-BELTS

Very flexible high-capacity V-Belts with *less stretch* ... so little that the efficiency of the drive is not affected. Built with larger grommets, having 40% more tensile strength, their ability to transmit greater HP means fewer belts per drive, reduction in over-all weight, and less space required for any given load. The over-size twin grommets are endless ... no intermediate overlapping or splicing. That's why "Power King" belts are much stronger, stretch less, carry greater loads and last 20 to 50% longer.

PACKINGS for Every Service

High-pressure Asbestos Packing, Style A-400 (illustrated) for steam, gas and oil; Self-sealing Molded Lip Packing for air, gas, oil, chemicals, steam, water, etc.; Square Braid Asbestos Packing Style A-444, for centrifugal and rotating pumps; Red Rubber Sheet Packing, Style M-16, for gaskets under saturated steam, hot or cold water and air; Braided and Twisted Valve Stem packing; Long-Line Flax Packing; Low-Pressure Duck and Rubber Stem Packing. Hot Oil Packing; Plastic Packing, and many others. Send for Packing Catalog.

"ALLGOOD" MAINTENANCE COATINGS

The economical way to give long-lasting protection to plant and equipment from the effects of weather, corrosion and other destructive agents. With no greater time or effort than required to apply ordinary paint, "Allgood" Maintenance Coatings can be brushed- or sprayed-on to give a tough, durable covering that will pay for itself over and over again through savings in maintenance and replacement costs. Equally effective on metal, wood and concrete. Made in several different formulas to meet specific conditions. Available in quart and gallon cans from your nearest Goodall branch.

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Standard of Quality—Since 1870

HOSE · BELTING · FOOTWEAR · CLOTHING
AND OTHER INDUSTRIAL RUBBER PRODUCTS

GOODALL *Rubber Company*

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J.

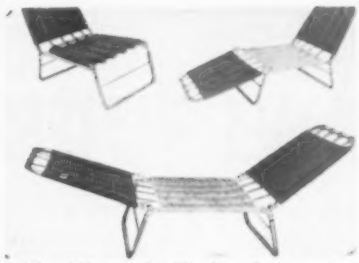
BRANCHES AND DISTRIBUTORS THROUGHOUT THE UNITED STATES.
IN CANADA: GOODALL RUBBER CO. OF CANADA LTD., TORONTO.

FACTORY / EQUIPMENT NEWS

Begins on page 90

For more about these items, circle item numbers on Reader Service Card next to back cover.

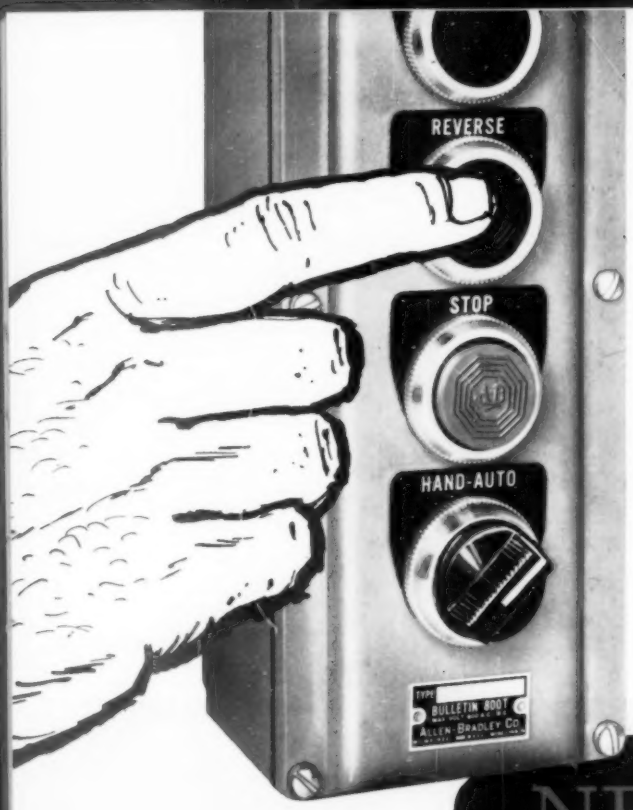
144—Process Timer brings advantages of automatic control to manual operations, signals operator each step of the way. This "Timeter" is used where a sequence of timed steps must be performed by operator; standard time ranges are 1, 2, 3 hours. *Bildwell Products.*



145—"Dreambed" is that extra-piece of furniture for your office on which you can steal an extra snooze or a needed break in a long day. It locks in 20 varied positions—as chair, table, lounge; folds down to 2-ft.-sq. for compact storage. About $25. *Bernan Steel, Inc.*

146—Remote Control for circuit breakers is provided by versatile new motor-operated mechanism. You don't have to walk over to turn units on or off—fast-working device offers continuous current ratings to 800 amp., to 600 v. a-c and 250 v. d-c. *I-T-E Circuit Breaker Co.*

Turn to page 106



A-B Reliable Control Units

for every industrial application

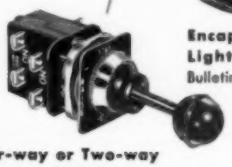
Among the many hundreds of Allen-Bradley push button and control units, you are certain to find the types best suited to your particular needs. The seven units shown below are a few of the latest additions to the Allen-Bradley *quality* line of control units.

All Allen-Bradley control units—standard duty, heavy duty, and oiltight—have double break, silver alloy contacts—to assure reliable operation. Simple constructions and generous wiring room are outstanding features. Insist on Allen-Bradley control units for *all* of your equipment—you can't go wrong!

NEW

Illuminated Push Button. Combines pilot light and push button in one unit. Oiltight Bulletin 800T.

Push-to-Test Pilot Light. Oiltight Bulletin 800T.



Four-way or Two-way Selector Switch. Oiltight Bulletin 800T.

Encapsulated Pilot Light. Heavy Duty Bulletin 800.

Encapsulated Pilot Light. Oiltight Bulletin 800T.

Time Delay Push Button. Delay is adjustable from 0.5 second to 5 seconds. Oiltight Bulletin 800T.

Double Circuit Push Button. Has 2 N.O. or 2 N.C. contacts. Oiltight Bulletin 800T.

ALLEN-BRADLEY OFFERS the most complete line of standard duty, heavy duty, and oiltight control stations on the market. Send for Publication 6090 today.

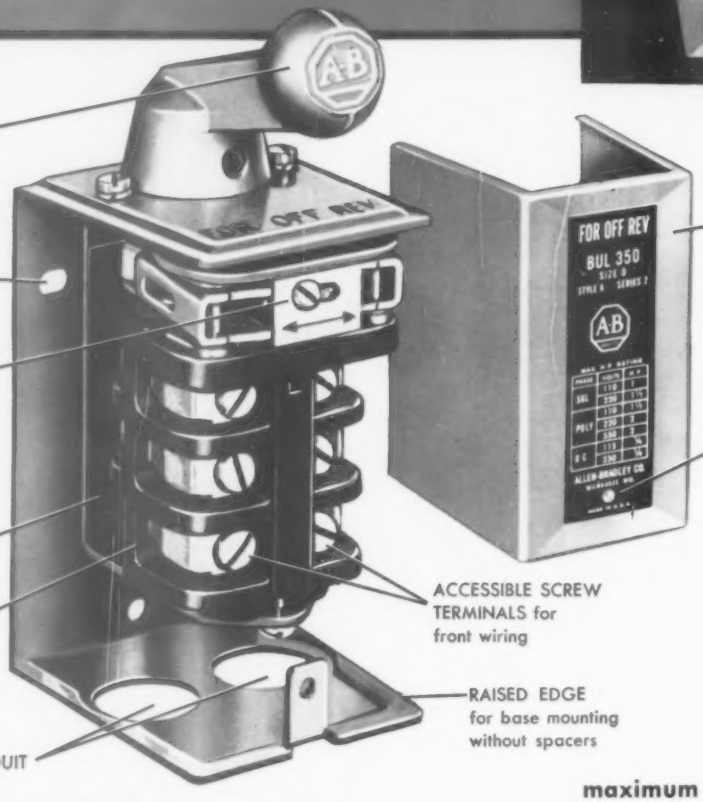
1-59-MR

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

A new "quality" standard for small REVERSING DRUM SWITCHES

A-B QUALITY



GOOD-LOOKING AND GOOD "FEELING" DIE CAST HANDLE

EASILY ACCESSIBLE MOUNTING HOLES

MERELY LOOSEN SCREW AND SLIDE PLATE to change from momentary to maintained contacts —or vice versa

INDEPENDENT SWITCH MOUNTING prevents misalignment

HEAVY CONTACT SURFACES for long operating life

TWO CONDUIT OPENINGS

WRAP-AROUND COVER gives complete access to drum

SINGLE SCREW COVER MOUNTING —screw cannot fall out

ACCESSIBLE SCREW TERMINALS for front wiring

RAISED EDGE for base mounting without spacers

maximum rating
2 horsepower

NEW OILTIGHT COVER PLATE FOR CAVITY MOUNTING

Bulletin 350 Reversing Switch can be furnished with oiltight cover plate with rubber gasket seal for cavity mounting in a machine base.

This *all-new* Allen-Bradley reversing drum switch was designed to keep pace with the mechanical beauty designed into so many of the modern machine tools.

The Bulletin 350 reversing switch is equivalent to a three-pole, double throw switch . . . and can be used with d-c motors; or single phase, two phase, or three phase a-c motors.

Investigate the Bulletin 350 . . . the *new leader* of its class . . . in appearance, ease of installation, and operating life. An Allen-Bradley *quality* switch . . . in every sense of the word. Send for descriptive bulletin.

ALLEN-BRADLEY
MOTOR CONTROL
QUALITY

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

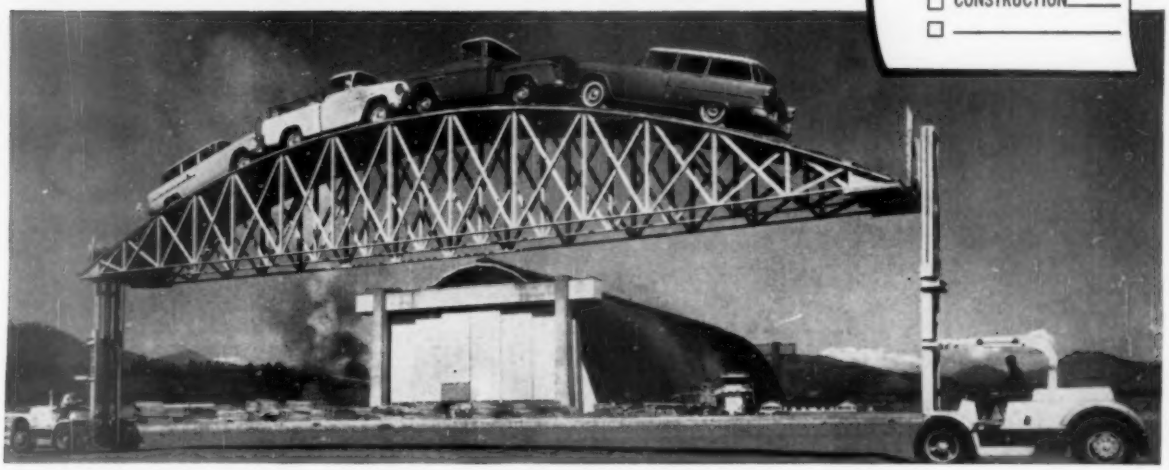
1-59-MR

A REPORT TO MANAGEMENT ON HOW

Industry cuts costs with FIR PLYWOOD

ROUTE TO:

- ☐ ENGINEERING
- ☐ PRODUCTION
- ☐ SALES
- ☐ PURCHASING
- ☐ MAINTENANCE
- ☐ CONSTRUCTION
- ☐ _____



Long span, low cost. Sixty foot fir plywood trusses like this helped hold construction costs to $2 per foot on Diamond Lumber Co.'s big Portland, Ore., warehouse. The strength and stiffness of the truss—dramatically demonstrated above—is achieved by stressing the plywood in a curve; the continuous scarf-jointed panel acts as both top chord of truss and roof decking.

Fragile! Package with plywood. Valuable and easily damaged articles like guided missile components (shown here being shipped in special re-usable crates) get better protection with plywood for less than half the cost of other, less rugged packaging materials at Lyon Van & Storage Co.'s California export division. Firm uses 75,000 sq. ft. monthly for packaging of all types.

How to modernize boxcars fast. A new method of stapling fir plywood directly over damaged lumber lining is helping Southern Pacific upgrade B and C cars into Class A carriers in record time. It takes only one-third as long as installing new T&G lumber—and cuts costs in half. Work on 400 cars is being done at SP's West Oakland and Roseville, Calif., yards. Cars are out of service only a short time; labor time averages 8 to 10 man hours per car. The more valuable ladings which can be carried in the upgraded cars is often enough to recover the cost in a single run.

FOR MORE INFORMATION about fir plywood—its uses, properties and advantages—write

DOUGLAS FIR PLYWOOD ASSOCIATION

TACOMA 2, WASHINGTON

—an industry-wide organization devoted to research, promotion and quality control

Always specify by DFPA grade-trademarks

DFPA TESTED QUALITY

For more facts Circle 488 on Reader Service Card

FOR

GREATER

"SMALL-TUBE"

reliability

...replace with RCA "Premiums" and "Special Red" Tubes

Recommended wherever increased reliability of small-tube circuitry is important. Characteristics are uniform throughout useful life. Rigid controls and rigorous tests weed out "early failures". Designed and built to give dependable performance under conditions of shock and vibration. Available at RCA Industrial Tube Distributors.

RADIO CORPORATION OF AMERICA
Electron Tube Division Harrison, N. J.

Handy data book RIT-104-A includes the tube characteristics you need to know when you install RCA "Premium" and "Special Red" Tubes. Free, from your RCA Industrial Tube Distributor.

FACTORY / EQUIPMENT NEWS

Begins on page 90

For more about these items, circle item numbers on Reader Service Card next to back cover.

147—Easy-to-Use Air Gage permits accurate measurement to 0.000001 in. New "AG" gage can be used to check ID's, OD's and center distances of holes, regardless of size; also to check roundness of ID's, OD's and blind holes on small precision parts. *B. C. Ames Co.*

148—Centrifugal Roof Ventilators are a new series of direct drive and belt drive (pictured above) models. Recommended particularly for industrial ventilating systems, these low silhouette units are designed to blend with modern roof lines. *Power Line Fan Co.*

149—Nail Driving Adapter fits all electric and pneumatic hammers and makes itself useful in driving large quantities of nails and spikes in hard-to-reach places. Adapters are also available for driving speed nuts, rivets, and other fasteners. *Modern Mfg. Co., Inc.*

Turn the page

A TREMENDOUS SUCCESS

because they combine Safety with Wearer Appeal!

AO 2-TONE ULTRASCOPIC SAFETY SPECTACLES

Plant eye protection programs *really work* when glasses like these guard workers' eyes! That's why safety directors everywhere have acclaimed the new AO F9700 2-TONE ULTRASCOPIC — and backed their enthusiasm for these safety glasses with a deluge of orders!

1. They know that they are buying a true safety frame as well as true safety lenses with *every* pair. A frame that will hold lenses and eyewire with a vise-like grip if hit severely. (Non-safety frames cannot provide this protection.)

2. They know that they are buying safety glasses with an eye-appeal that makes men and women workers exclaim "That's for me!"

You can see that the AO F9700 2-Tone Ultrascopic is *handsome* eye protection. You can also see that it is *safe* eye protection by the AO plaque on the frame front which indicates a true safety frame. That's why we say give your workers the SAFEST, the SMARTEST, the FINEST!

- 2-tone onyx on clear crystal plastic frame
- matching spatula temples
- 6 Curve Super Armorplate clear, medium Calobar, dark Calobar and extra dark Calobar lenses. Also available with clear Plastolite lenses.

American Optical
COMPANY
SAFETY PRODUCTS DIVISION

Always insist on the AO Trademark on lenses and frames.

SOUTHBRIDGE, MASSACHUSETTS
Branches in Principal Cities

For more facts Circle 490 on Reader Service Card

CAM-ALLOY STEEL
HIGH TEST STEEL
WROUGHT IRON

Come To CAMPBELL
For *The Complete Line*
of SLING CHAINS

every type — every size
every grade — every attachment

Whatever *your* particular application, Campbell will deliver exactly the right assembly! All Campbell Sling Chains are available in 3 grades—Cam-Alloy Steel, High Test Steel and Wrought Iron.

GUARANTEED
FOR A FULL YEAR!

Send *today* for your free copy of
Campbell's new Sling Chain Handbook

It contains complete details on all Campbell Sling Chain equipment—together with lots of valuable information on care and use. And you'll find step-by-step instructions for ordering each type of sling chain and attachment—illustrations—specifications and working load limits for all grades.

CAMPBELL CHAIN *Company*

CAMPBELL CHAIN

York, Pa. • West Burlington, Iowa

Warehouses: E. Cambridge, Mass. • Seattle, Wash. • Portland, Ore. • San Francisco, Los Angeles, Calif.

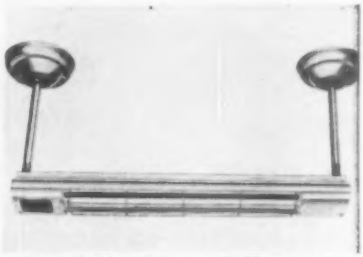
FACTORY / EQUIPMENT NEWS

Begins on page 90

For more about these items, circle item numbers on Reader Service Card next to back cover.

150—Portable Dry Chemical extinguishers are (left to right) 5-, 10-, 20-, and 30-lb. models (UL ratings are 8, 16, 20, and 20 B:C). These "D" models are red or white (with matching hanging brackets) for good visibility inside or outside the plant. *Ansul Chemical Co.*

151—Hydraulic Cylinder and valve is designed to allow the operator full control of depth (stroke) from a remote station. The hydraulically positioned floating piston continues to repeat this stroke until operator changes the position. *Densmore Engineering Co.*



152—Ceiling-Mounted Heater provides radiant "spot heating" in hard-to-heat areas. Comfort is induced by direct radiation on workers and surrounding desks, benches, and machines, which—in turn—become generators of radiant heat. Six sizes. *Edwin L. Wiegand Co.*

153—Heat Exchanger Motor provides a wide adjustable speed range; also serves constant speed applications. Available in ratings from 25 to 300 hp. for indoor or unprotected service; comes in explosion-proof enclosure for hazardous installations. *Louis Allis Co.*

Turn the page

US PowerGrip T

THE ORIGINAL BELT WITH TEETH

The U.S. PowerGrip "Timing"® Belt is one belt that delivers POSITIVE drive, non-slip performance all the time. During the eight years since it was patented by "U.S." this "Timing" belt with teeth has been popularly referred to as the "T" belt.

So indispensable has this "Timing" belt become that thousands of plants, girding for power and automation, are using the T belt. It not only gives non-slip performance, it will never stretch and will outlast all others. Besides, it requires no lubrication, no maintenance. And since this belt requires virtually no initial tension at installation, think of how this prolongs bearing life.

Your U. S. Power Transmission Distributor carries a full line of stock sizes, has the experience and engineering know-how to help you convert quickly and easily.

• • •

When you think of rubber, think of your "U. S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

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January 26-29, 1959

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Management: International Exposition Company

FACTORY / EQUIPMENT NEWS

Begins on page 90

For more about these items, circle item numbers on Reader Service Card next to back cover.

154—Floor Machine is battery powered, cleans 20,000 sq. ft. of floor per hour—doing the whole job. It dispenses clean water, scrubs, vacuums up the dirty water. The four 24-v. battery pack, housed in front, can be quickly removed for recharging. *S. C. Lawlor Co.*

155—Star Drilling Machine, air-operated, is designed for dustless operation. It automatically sucks in any dust and chips produced while drilling in concrete, stone, and other hard materials. The unit rotates automatically during drilling. *Thor Power Tool Co.*

156—Automatic Compressor Control System in remote console continuously supervises and checks compressor operation and gives warnings—shuts down compressor—if malfunction occurs. "Tendmatic" unit is for machines of 100 to 7500 hp. *Ingersoll-Rand Co.*

Turn the page

AMERICAN® AND OLD FAITHFUL® MARKERS

FAMOUS FOR VERSATILITY!

You Make It—We'll Mark It!
American and Old Faithful serves you best by bringing you the dependable, durable crayon you want for every industrial marking and shipping need.
Write for free marking data! Dept. F-65.

THE AMERICAN CRAYON COMPANY
SANDUSKY, OHIO NEW YORK

AMERICAN
REG. U.S. PAT. OFF.

Circle 494 on Reader Service Card

WHY USE THIS MUCH?

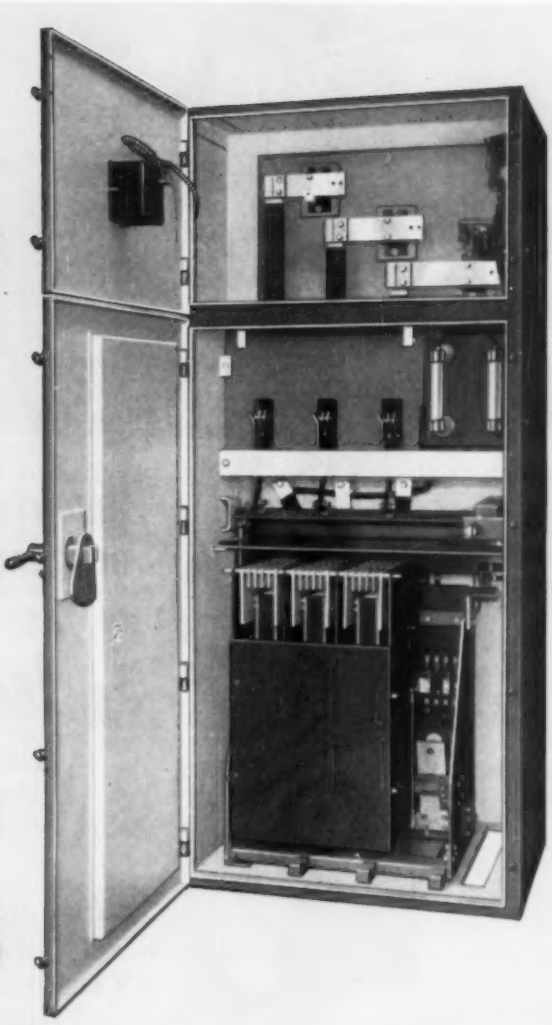
WHEN ALL YOU NEED IS THIS MUCH

See Page 230

NEW EC&M STARTER

GIVES 100/150 MVA fault protection

WITHOUT FUSES!



Proven by tests conducted by an independent testing station, EC&M's new "fuseless" ZHA air-break starter has a certified interrupting capacity of 100,000 KVA at 2400 volts, 150,000 KVA at 4800 volts. This starter is simpler and much more accessible for inspection and checking connections.

The ZHA starter is not subject to problems associated with fuses. Single phasing due to blown fuses is eliminated...no costly replacement fuses to stock.

For positive personnel safety, the ZHA is equipped with a 3-way doorlatch, interlocked between disconnect switch and contactor interlocking system. The disconnect switch is gang-operated. When the door is open, disconnect blades are *visible* in the open and grounded position.

No roll-out needed...phase barrier and arc-chutes draw out horizontally, making front and rear contact tips readily accessible. Bus bars are used for power connections throughout the starter. Redesigned arc-chutes and interphase barrier, and improved contactor are additional features which make the ZHA starter your logical choice for high-voltage motor drives.

***GET THE COMPLETE STORY** on certified fuseless fault protection for high-voltage motor drives. Write for Bulletin 8130*

THE ELECTRIC CONTROLLER & MFG. CO.
A DIVISION OF THE SQUARE D COMPANY
CLEVELAND 28 • OHIO

2320

INTRODUCING...

NOW...
select from a complete range of capacities and speeds...1/8 to 2 tons and 8 to 60 fpm.

important new models of the Lodestar® electric hoist

NEW MODELS in 1/2, 1 and 2 tons

LODESTAR FEATURES INCLUDE:

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- Lowest Headroom
- Push Button Control
- Fully Enclosed Components
- Self-Adjusting Magnetic Brake
- Ultra-Modern Electric Braking
- CM-ALLOY Flexible Link Chain
- Minimum-Maintenance Operation
- Lifetime Lubrication

Request catalog and name of local stocking distributor.

LARGER CAPACITY and FASTER SPEEDS
...for speedier, lower cost materials handling

● Here's your opportunity to slash lifting and handling costs. Put these new Lodestars to work where their increased speeds and capacity match your maximum requirements. Many thousands already in service demonstrate that you, too, can benefit from more efficient handling, lowered costs and increased productivity.

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CHISHOLM-MOORE HOIST DIVISION
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In Canada: McKinnon Columbus Chain Ltd., St. Catharines, Ont.

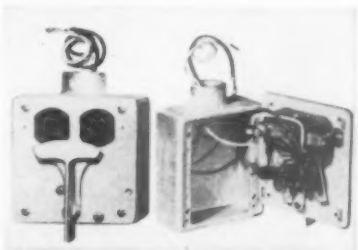
FACTORY / EQUIPMENT NEWS

Begins on page 90

For more about these items, circle item numbers on Reader Service Card next to back cover.

157—Manifolded Hydraulic Panel uses building-block idea to reduce panel piping. Standard component subplates have pressure, return, and drain lines manifolded within the block. Complete re-use of parts for future circuit modifications is permitted. *Petch Mfg. Co.*

158—Spray Nozzles pass large quantities of liquids at low pressures—in uniform solid-cone sprays. These nozzles produce medium to coarse, evenly distributed, solid-cone sprays—suitable for scrubbing fumes, cooling and washing gases, etc. *Schutte and Koerting Co.*



159—Interlock Receptacles—non-sparking, wall-mounted units—permit using any cord set safely in hazardous locations. These economical units are used like ordinary wall plugs. Plug can be inserted and locked in receptacle with no danger of sparking. *Panellit, Inc.*

160—Adjustable Speed Sheave, stationary-controlled, is available for A, B, and C section belts in 2, 3, and 4-groove construction. "Adjustex" sheaves offer reduced initial and maintenance costs. Capacities to 75 hp. are covered by 33 sizes. *Allis-Chalmers Mfg. Co.*

Turn the page

How RYKON GREASE

has performed in six tough applications

In just two years since introduction, RYKON Grease has stepped in to deliver lubrication in hundreds of applications where other greases have failed

The reason RYKON Grease can perform under conditions that cause other greases to fail is this: RYKON Grease has a unique non-soap, organic thickener. This thickener holds the oil between its fibers better than any other gelling agent. The thickener is able to withstand extremely high as well as low temperatures. It resists chemical action and remains stable under conditions of severe working and water washing. RYKON Grease has exceptional anti-rust properties.

RYKON Grease's unique properties make it truly multi-purpose. This leads to many worthwhile economies. With one grease to do possibly every grease lubrication job in a plant, there's no chance for application mistakes. Inventory and handling of many single-purpose greases is reduced or eliminated. Maintenance training and supervisory follow-up is greatly reduced.

More facts about RYKON Grease are yours for the asking. Call the lubrication specialist in your nearby Standard Oil office in any of the 15 Midwest and Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 S. Michigan Ave., Chicago 80, Illinois.**

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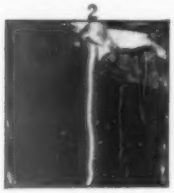


3

4

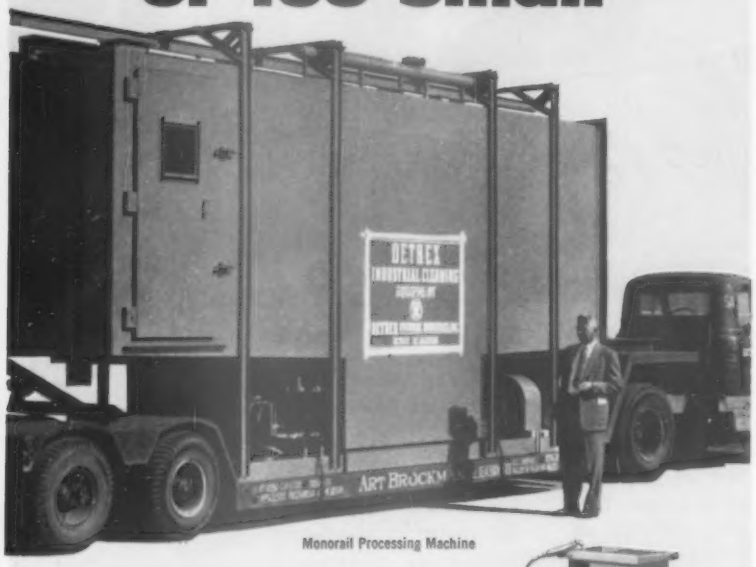
In the metalworking industry, where higher speeds, loads, temperatures and pressures are being put on bearings as a means of increasing productivity of equipment, a new type of grease has been needed. RYKON is that grease. Here are just 6 examples of how RYKON Grease has performed in tough spots:

Industry	Equipment	Type of Bearings	Conditions	Remarks
Metalworking	bearings over molten pot	—	high temperature	Temperature reaches 500° F. at times. RYKON stays in longer.
Steel Mill	pit crane, floor crane, charging car	plain and anti-friction	high temperature	Lasts twice as long as some other greases used.
Metalworking	drill head multi-spindle	anti-friction	heavy load	Other greases failed. Running cool on RYKON. No leakage.
Auto Manufacturer	switches on machine tools	—	wet	Good water protection and dielectric strength at a lower cost than previously.
Die Caster	die cast machines	various	high temperature	Cut down wear considerably.
Bearing Manufacturer	high speed spindle bearings	anti-friction	high temperature, heavy load	Lasts twice as long as a high priced bearing grease. Does not darken or form varnish.

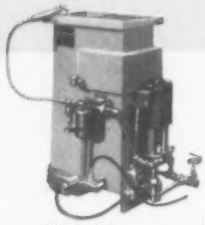
You expect more from STANDARD *and you get it!*

Oven test shows high temperature performance of RYKON Grease. 1. Metal panel coated with RYKON and placed in oven at 350° F. 2. Same panel after five days. RYKON is still soft and ready to lubricate. 3. Another high-melt grease ready for same test. 4. Same panel after oven test. Grease has failed completely.

Nothing too Big or too Small



Monorail Processing Machine



Ultrasonic Degreaser

DETREX EQUIPMENT Cleans Them All

Ranging from single stage, hand-operated degreasers through huge spray washers, or multi-stage processing machines, DETREX has the experience and ability to provide equipment that saves you money. If your cleaning process requires ultrasonics you can be serviced by the leader in the field with famous Detrex "Soniclean" units.

When DETREX equipment is applied to your specific needs, coupled with DETREX chemicals and DETREX service, you have the highest degree of quality and efficiency in the metal cleaning field. You can have it in your operation tomorrow. Find out about it today.

Depend on DETREX for Every Metal Cleaning and Processing Need

- Solvent Degreasers
- Ultrasonic Equipment
- Industrial Washers
- Phosphate Coating Compounds
- PAINTBOND Compounds
- Aluminum Treating Compounds
- Alkali and Emulsion Cleaners
- PERM-A-CLOR NA (Trichlorethylene)
- Rust Proofing Materials
- Extrusion and Drawing Compounds
- Spray Booth Compounds

DETREX CHEMICAL INDUSTRIES, Inc.

Box 501, Dept. F-159, Detroit 32, Mich.

For more facts Circle 498 on Reader Service Card

FACTORY / EQUIPMENT NEWS

Begins on page 90

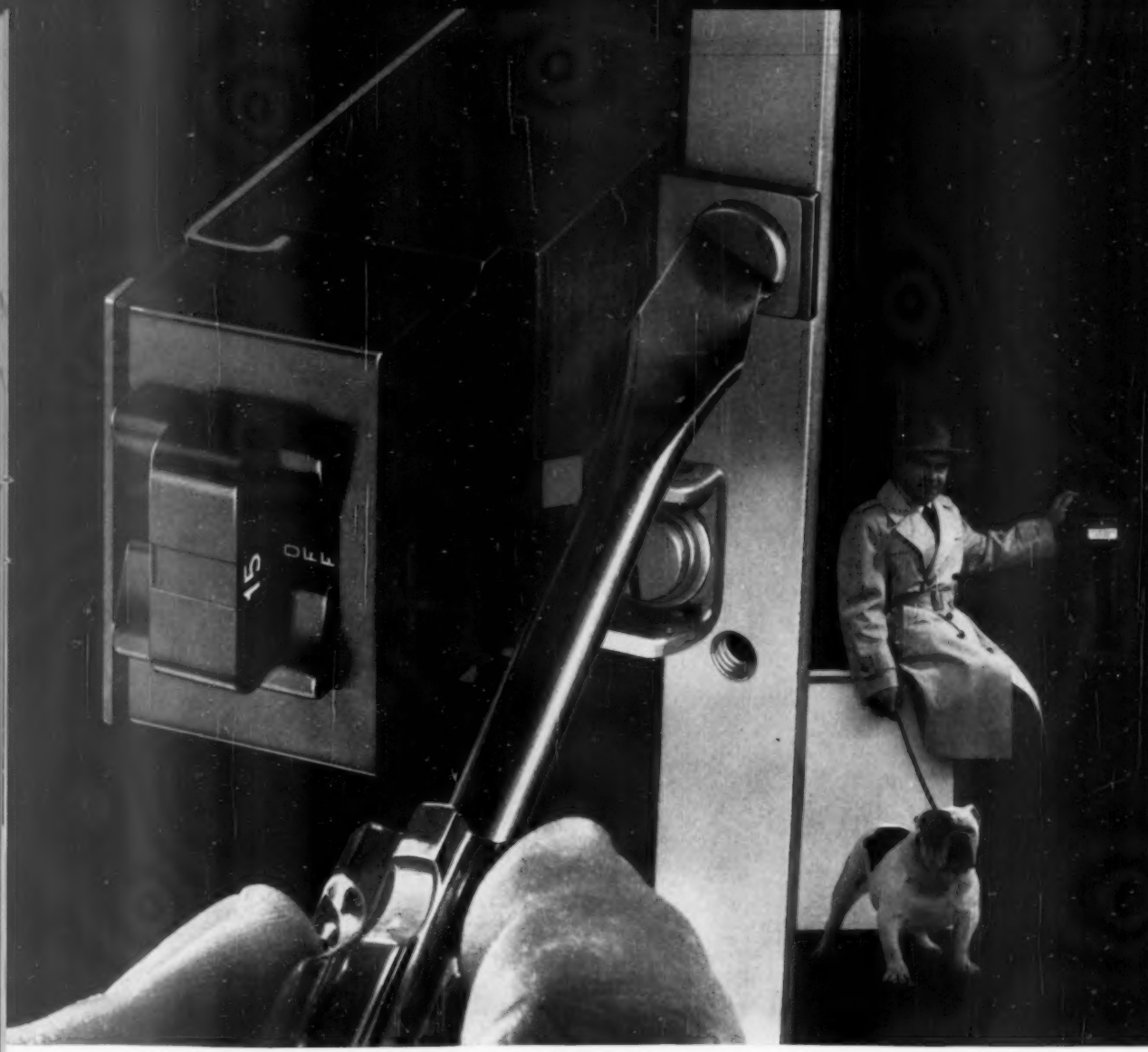
For more about these items, circle item numbers on Reader Service Card next to back cover.

161—Air Dryer-Receiver Combo unit can operate from large central station (or small scattered units) to deliver moisture-free air (non-freezing) to instruments, pneumatic devices, etc., anywhere in plant. Capacities to 8000 scfm. and 6000 psi. *Van Products Co.*

162—Circuit Breakers—individually enclosed K-line with "visible break" design—offer easier installation and service; easier access for making cable connections; added safety features. Rated 600 v. in 225-, 600-, 1600-amp. frame sizes. *I-T-E Circuit Breaker Co.*

163—Sliding-Seal Valves with threaded ¼ N.P.T. exhaust ports pipe away troublesome exhaust air to a neutral point, eliminating annoying air blasts and noises. Valves come in 2-, 3-, and 4-way types with levers for hand or mechanical actuation. *A. Schrader's Son.*

Turn the page



NO TROUBLE CALLS WITH PUSHMATIC . . .

bolted connections are standard on every breaker

Ever hear of "nuisance tripping" in circuit breakers? It occurs regularly in many plants — boosting maintenance, hampering production, costing plenty. But not when Pushmatic® is on the scene. Here is a circuit breaker that thinks for itself — that puts an end to trouble calls. And here's why...

Unlike plug-in type breakers, a Pushmatic *bolts* to a bus bar, cannot work loose and cause excessive heating. It provides a high-pressure, low-resistant, *positive* connection always.

No complicated installation either. It can be installed simply and quickly by merely tightening a captive screw onto the bus bar.

Other Pushmatic plusses: Pushbutton convenience and control . . . quality you can depend on. More than a dozen individual tests are given each and every Pushmatic before packaging. The result is *proved* performance *every* time. Get Pushmatic and end trouble calls.

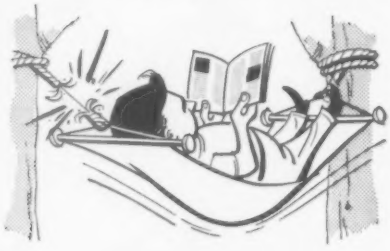
© BEPCO

BULLDOG

BullDog Electric Products Company, Division of I-T-E Circuit Breaker Company, Detroit 32, Mich. *BullDog Export Division:* 13 East 40th St., New York 16, N.Y. *In Canada:* BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Rd., Toronto 15, Ont.

For more facts Circle 499 on Reader Service Card

Don't wait
till you need
Dependability-



Get it *now*
with

H & S Helical Gears

H & S Helical Gearing with overlapping tooth action is your ideal choice for power transmission on parallel shafts where speeds are high, where loads are high, and where smooth action is desired. Here's why —

- Correct machining of blank and accuracy of tooth generation reduce impact and increase load carrying capacity.
- Extra heavy rims, arms and hubs provide greater strength and stability.

H & S Helical Gears are available with diameters up to 125", 1 D.P. and 40" face.

It will pay you to learn more about the extra quality built into every H & S Gear. Send us your requirements. Quotations will be forwarded by return mail.

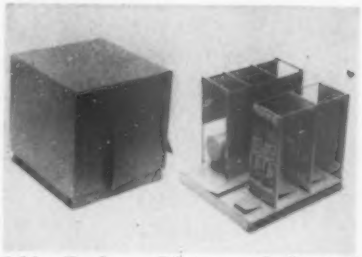
Send for your free copy of H & S Gear Catalog No. 57.

THE HORSBURGH & SCOTT CO.
GEARS AND SPEED REDUCERS
5112 Hamilton Avenue
Cleveland 14, Ohio

FACTORY / EQUIPMENT NEWS

Begins on page 90

For more about these items, circle item numbers on Reader Service Card next to back cover.

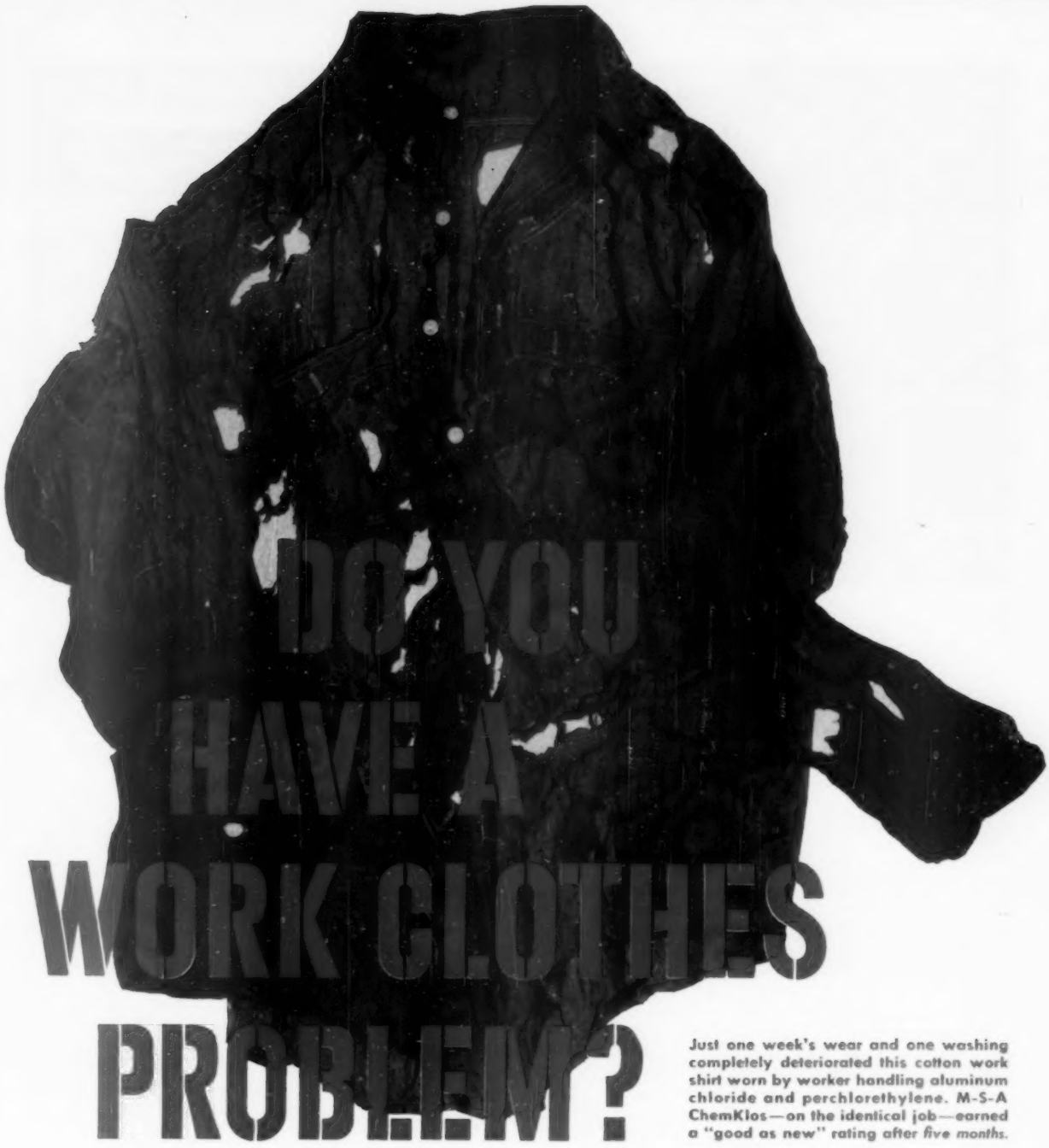


164—Package Motor and Control room shows (right) typical a-c and d-c control, motor-generator set, motor-operated rheostats, and associated control equipment as it would be installed. Basic enclosed room (left) is 8 ft. high, up to 20 ft. long. *General Electric Co.*

165—Portable Pneumatic Grinders for many jobs come in various sizes and models. Horizontal grinders have speeds to 12,000 rpm.; wheel sizes 3 to 8 in. dia.; lever, straight, or grip-type handles. Die grinders are rated 40,000 or 60,000 rpm. *Thomas C. Wilson, Inc.*

166—"Short" Inspection Table occupies only 6x2-ft. floor space, seats two operators. Work surface of belt is 15 in. wide by 36 in. long; stainless steel hopper has 2-cu.-ft. capacity. Vibratory feeder distributes parts evenly across the belt. *G. F. Goodman & Son.*

Turn the page



DO YOU HAVE A WORK CLOTHES PROBLEM?

Just one week's wear and one washing completely deteriorated this cotton work shirt worn by worker handling aluminum chloride and perchlorethylene. M-S-A ChemKlos—on the identical job—earned a "good as new" rating after *five months.*

Here's an economical way to reduce this red ink item:

Job-tested M-S-A ChemKlos—made entirely of Dynel—last longer, cost less in the long run than ordinary work clothes up against acids, caustics, moths, mildew, shrinkage, snagging, tearing. It's what MSA does with the cloth that makes the money-saving difference.

New anti-static treatment eliminates clinging, withstands 50 washings. All strain points are bar tacked. All outer seams are double or triple stitched . . . with acid-resistant thread. Buttonholes are eyeletted. Order your work clothes from a factory-trained MSA man. Save your company some money.

Write for new bulletin for size and construction details. Mine Safety Appliances Company, 201 N. Braddock Avenue, Pittsburgh 8, Pa. Mine Safety Appliances Company of Canada, Ltd., 500 MacPherson Avenue, Toronto 4, Ontario.

MSA . . . where safety problems become safety products through research

MSA® SAFETY EQUIPMENT HEADQUARTERS

A-W Hydraulic Crane quickly and easily removes this 6000-lb.-engine and propeller assembly on a Delta Air Lines DC-7.

Versatile Austin-Western Hydraulic Crane speeds aircraft engine changes . . . saves Delta 1000 man-hours yearly

Delta selected the Austin-Western Hydraulic Crane as the outstanding materials handling machine to meet its exacting requirements for maneuverability and load, reach and boom clearance capacities.

Maneuverability important

All-wheel drive and all-wheel steering make the A-W 5-ton crane, with basic 18-ft. telescoping boom, a highly versatile piece of materials handling equipment.

In providing periodic inspection, maintenance and overhaul on its fleet of 73 aircraft, ranging from Super Convairs to DC-6, DC-7 and DC-7B's, Delta changes an average of more than 50 engines each month. It is estimated that use of the A-W crane saves 1000 man-hours annually on engine and propeller changes alone!

To Delta, the biggest single advantage of the A-W crane is its maneuverability around parked aircraft, maintenance stands and equipment. With all-wheel steering, the A-W can make a 90° turn in less radius than its own length. The boom rotates a full 360° for fast front, rear or over-the-side pickup or unloading.

A dependable precision tool

A-W dependability makes work scheduling easier, speeds aircraft back to operational status. Delta has discovered many uses for this all-purpose hydraulic crane in its operations. It is a precision tool that does work faster and easier, with less operator fatigue.

Learn now why men responsible for materials handling everywhere are so enthusiastic about this hardworking new hydraulic crane. See your nearby A-W distributor or write us today for complete information.

Austin 100th YEAR Western
CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.
BALDWIN · LIMA · HAMILTON
Power graders • Motor sweepers • Road rollers • Hydraulic cranes

118 For more facts Circle 502 on Reader Service Card

FACTORY / EQUIPMENT NEWS

Begins on page 90

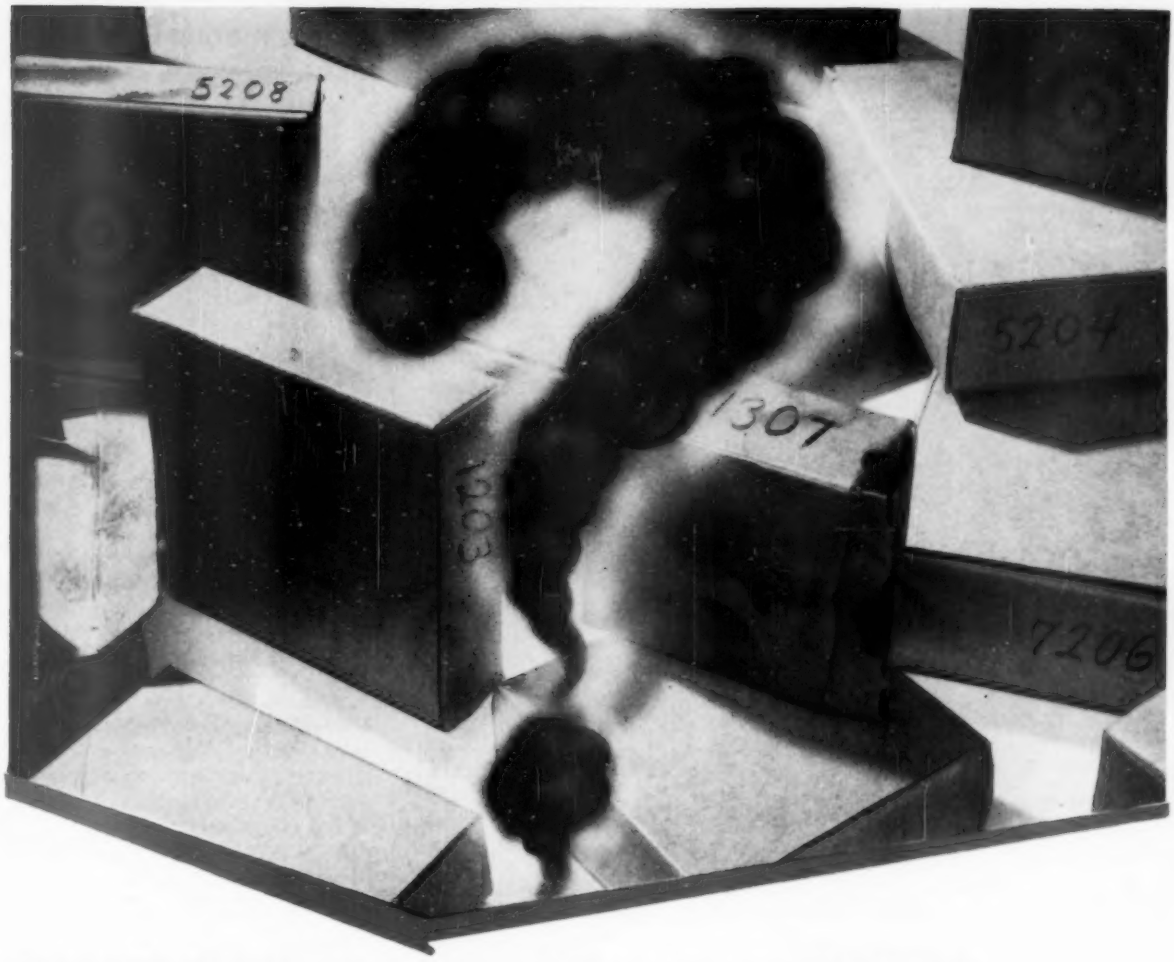
For more about these items, circle item numbers on Reader Service Card next to back cover.

167—Electric Duct Heater package unit is readily inserted in ducts by fitting into a rectangular opening in side or bottom. Comes completely wired for connection to power system, for use with package air conditioners and similar units. *Commercial Controls Corp.*

168—Top-Screw Chain Vise ends knuckle-busting, speeds pipe work. Features a large, easy-to-operate chain tightening handle right on top of vise base (no stooping or groping). Handle and tightening nut are anchored to base. Capacity to 5-in. pipe. *The Ridge Tool Co.*

169—Clip-On D-C Milliammeter employs a pen-size probe which clips around a wire without interrupting the circuit. Current is then read directly on the milliammeter. No need to break and resolder leads, no loading the circuit under test. *Hewlett-Packard Co.*

Turn the page



Don't buy a "bearing in a poke" . . . buy from your authorized source, Bearings, Inc.!

Know what you're buying — *Know* that the manufacturer and Bearings, Inc., as an authorized distributor, stand back of every bearing we sell you! *Know* you're getting the latest most improved design with a maximum, useable life.

Know the bearings you buy are in the manufacturers' original boxes, carefully protected from dirt and corrosion. *Know* that your bearings are as specified for precision and fit.

Don't buy a "bearing in a poke" from unauthorized sources — Contact your nearest Bearings, Inc. branch and get the best bearings for your needs. You will save time, trouble and money in the long run!

Providing bearing service in the North ➤ **BEARINGS, INC.**

OHIO: Akron • Canton • Cincinnati • Cleveland • Columbus • Dayton • Elyria • Hamilton • Lima • Lockland • Mansfield • Toledo • Youngstown • Zanesville
INDIANA: Ft. Wayne • Indianapolis • Muncie • Terre Haute • **PENNSYLVANIA:** Erie • Johnstown • Philadelphia • Pittsburgh • York
WEST VIRGINIA: Charleston • Huntington • Parkersburg • Wheeling • **NEW JERSEY:** Camden
NEW YORK: Buffalo, Balenrol Corp. • **MARYLAND:** Baltimore • **DELAWARE:** Wilmington

and in the South ➤ **DIXIE BEARINGS, INC.**

FLORIDA: Jacksonville • **GEORGIA:** Atlanta • **KENTUCKY:** Louisville • **LOUISIANA:** Baton Rouge • New Orleans
N. CAROLINA: Charlotte • Greensboro • **S. CAROLINA:** Greenville • **TENNESSEE:** Chattanooga • Kingsport • Knoxville • Nashville

interchangeable with all standard JIC cylinders

With the introduction of the ALL NEW T-J Squair Head, Tomkins-Johnson now offers industry the most complete design range of air and hydraulic cylinders. Presently available in bore diameters from 1-½ to 8 inches, the T-J Squair Head is an interchangeable cylinder which produces maximum force and efficiency, with minimum pressures . . . and is also adaptable to the use of low pressure oil as the working medium. Write today to The Tomkins-Johnson Co., Jackson, Michigan, for Bulletin #SQ 10-58 and complete details.

CHECK THESE 10 POINTS OF T-J SUPERIORITY

1. One Piece Piston
2. Hard Chrome Cylinder Bore and Piston Rods
3. High Tensile Steel Tie-Rods
4. Cushion Adjusting Screw, Externally Adjustable
5. New Super-Cushion for air, or Self-Aligning Master Seal for oil (T-J Patents)
6. Solid Steel Heads and Mounting Plates Standard all Models
7. Port Design Allows Minimum Pressure Drop on Inlet or Outlet
8. Chevron Type, Self-Adjusting Rod Packing
9. Piloted Packing Gland—Absolute Alignment
10. Piston Rod, Extra Strong—Polished and Chrome Plated for Efficiency and Protection

T-J TOMKINS-JOHNSON
RIVITORS . . . AIR AND HYDRAULIC CYLINDERS . . . CUTTERS . . . CLINCHORS

For more facts Circle 504 on Reader Service Card

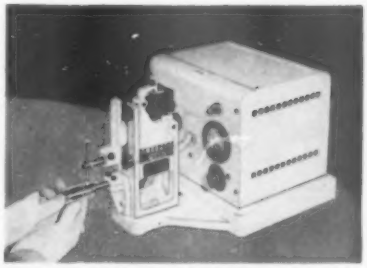
FACTORY / EQUIPMENT NEWS

Begins on page 90

For more about these items, circle item numbers on Reader Service Card next to back cover.

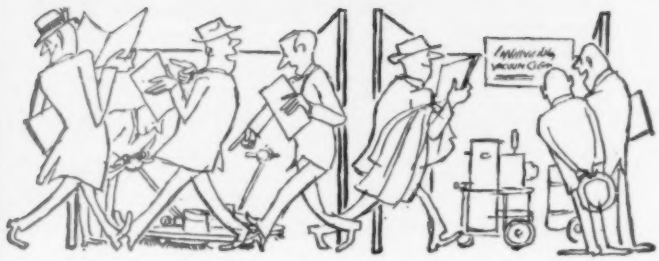
170—Heavy-Duty Limit Switch (Type HDH) uses one or two cam-opened, spring-closed, slow-acting switching elements. Rated to 600 v. at 25 amp. a-c or d-c; all standard enclosures. Adding magnet blowouts doubles interrupting capacity. *Westinghouse Electric Corp.*

171—Rotary Assembly Machine has an integral pressing station (14-ton capacity) to perform crimping, riveting, staking, and forming operations in the manufacture of small parts. Two models have dial sizes of 24 or 36 in.; up to 16 stations. *Ferguson Machine Corp.*



172—Resistance Welder, bench-type, has a stored energy panel of 80 watt-seconds capacity. Discharge time of 0.0008 to 0.0012 sec. assures reliable welds of dissimilar metals. Plier-type hand-piece is useful for hard-to-get-at welds. *Federal Tool Engineering Co.*

173—Automatic Program Control system incorporates a static photoelectric card reader, designed for rugged industrial applications. System employs dead-front panel construction with built-in testing circuits, static elements, indicating lights. *General Electric Co.*



10th National Plant Maintenance & Engineering Show
Public Auditorium, Cleveland
January 26-29, 1959

FACTORY'S

Guide to EXHIBITORS and PRODUCT INDEX

CONTENTS

	Page
How to See the Show	122
Guide to Exhibitors	122
Guide to Good Eating	134
Products Exhibited	146
Conference Program	182
Guide to Exhibitors Advertising in This Section	188

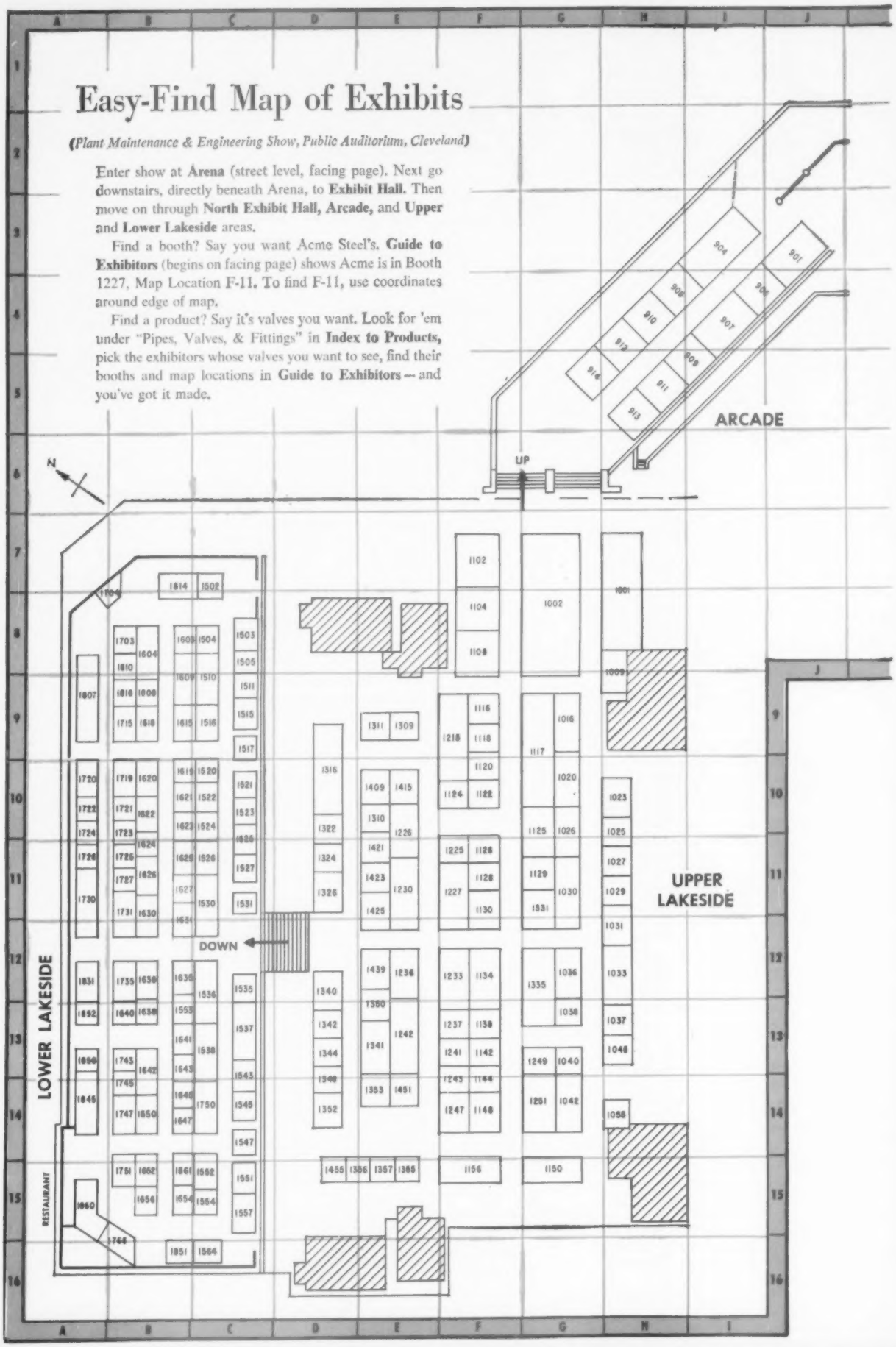
Easy-Find Map of Exhibits

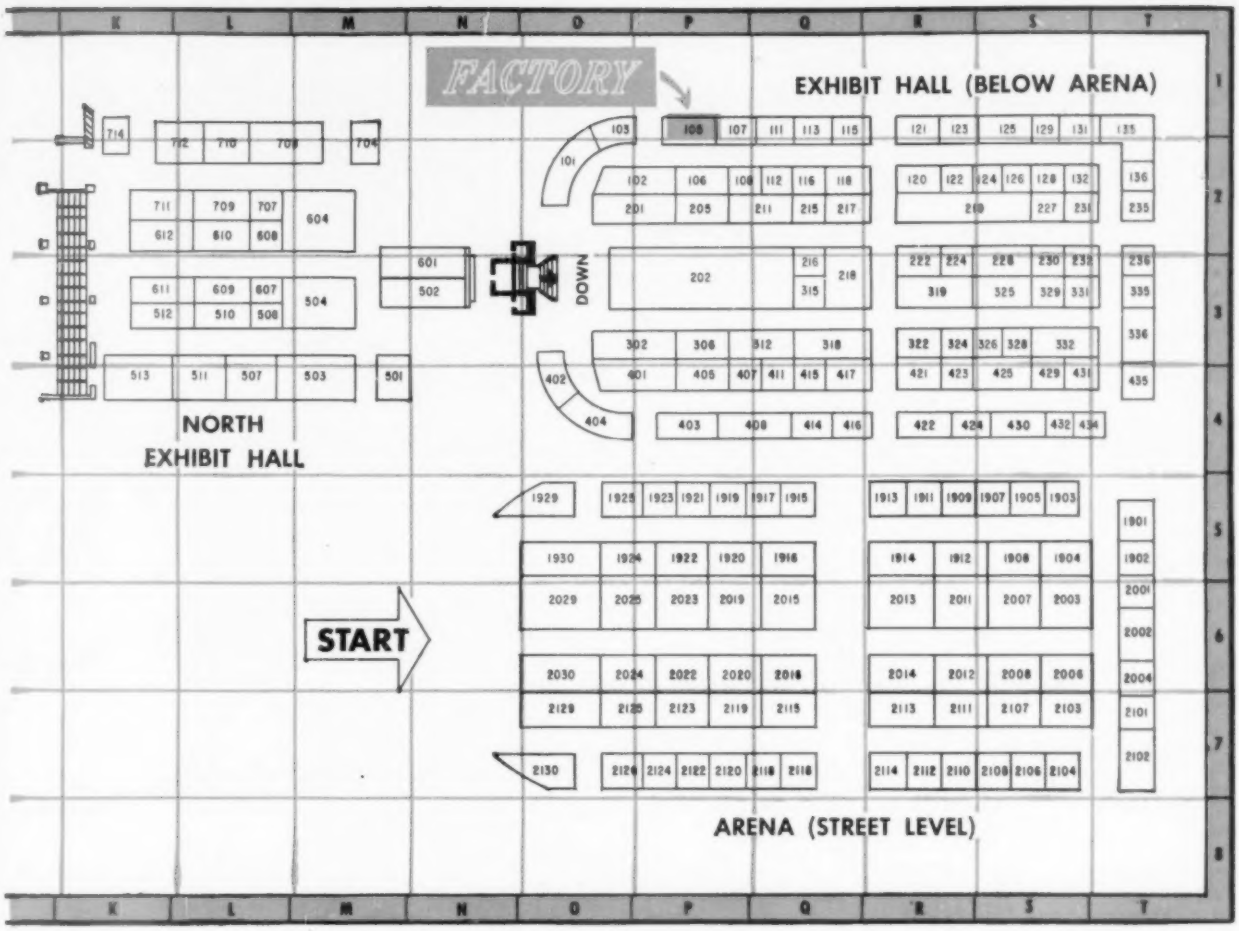
(Plant Maintenance & Engineering Show, Public Auditorium, Cleveland)

Enter show at **Arena** (street level, facing page). Next go downstairs, directly beneath Arena, to **Exhibit Hall.** Then move on through **North Exhibit Hall, Arcade,** and **Upper** and **Lower Lakeside** areas.

Find a booth? Say you want Acme Steel's. **Guide to Exhibitors** (begins on facing page) shows Acme is in Booth 1227, Map Location F-11. To find F-11, use coordinates around edge of map.

Find a product? Say it's valves you want. Look for 'em under "Pipes, Valves, & Fittings" in **Index to Products,** pick the exhibitors whose valves you want to see, find their booths and map locations in **Guide to Exhibitors** — and you've got it made.





How to See the Show

THIS IS a Big One. One of the three largest annual industrial shows in the nation. That's why you'll need the easy-find map (facing page and above, with instructions for use) as a quick guide. You'll want to keep it on hand when it's time to see the sights.

And there's more than just the map in this special part of FACTORY. As you leaf through the pages you'll find the following:

Guide to Exhibitors—It begins at your right. It's an alphabetical listing, arranged by company name. It will give you booth numbers and map locations.

Where to Eat in Cleveland— This dining guide begins on page 134. Whether your tastes run lordly or humble, you'll find a restaurant to suit you—plain or fancy, suitable for princes or paupers. FACTORY editors and McGraw-Hill gourmets have compiled the list, added their descriptive words. It includes all the first-rate eating places within easy distance of the Public Auditorium.

Index to Products Exhibited—Begins on page 146. The products are broken down into classifications (index to classifications on page 146), and within each classification manufacturers are arranged alphabetically. Booth number appears after each manufacturer's name.

Complete Conference Program—It begins on page 182. You'll find as many good ideas in the conferences and round tables as in the exhibits. Program lists all chairmen and speakers.

Exhibitor's Advertising—For a list of advertisers in this special FACTORY guide, see page 188.

GUIDE TO EXHIBITORS

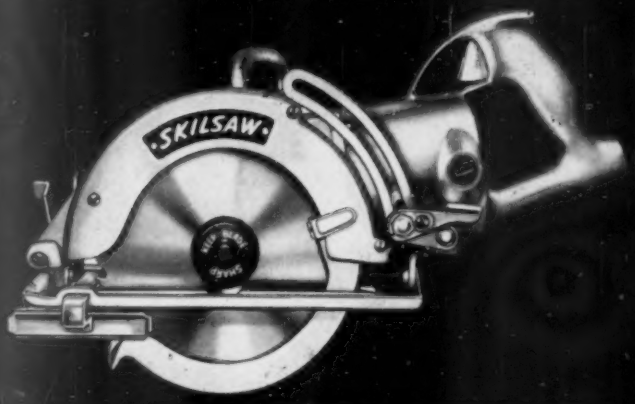
EXHIBITOR	BOOTH	MAP
A		
Acme Steel Co.	1227	F-11
Acme Visible Records, Inc.	101	O-2
Advance Floor Machine Co.	1156	F-15
Aeroquip Corp.	1134	F-12
Aget Manufacturing Co.	1251	G-14
The Airetool Mfg. Co.	1504	C-8
The Ajusto Equipment Co.	235	T-2
Alan Wood Steel Co.	216	Q-3
Alemite Div., Stewart-Warner Corp.	408	Q-4
Allis-Chalmers Mfg. Co.	1001	H-8
Aluminum Co. of America	218	Q-3
American Abrasive Metals Co.	1721	B-10
American Air Filter Co.	1545	C-14
American Chain & Cable Co. American Chain Div. Cable/Hazard Div. Wright Hoist Div.	2013	R-6
American District Telegraph Co.	2107	S-7
American Dryer Corp.	1851	B-16
American Floor Machine Co.	1316	D-10
American Institute of Plant Engineers	1129	G-11

Turn the page

GUIDE TO EXHIBITORS AT THE SHOW . . . *Begins on page 123*

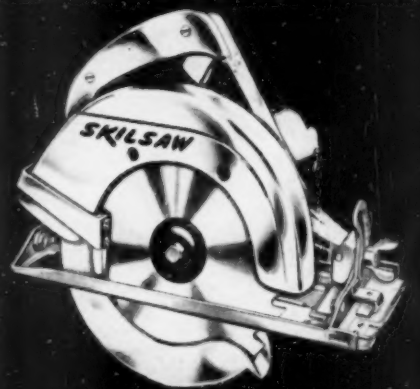
EXHIBITOR	BOOTH	MAP
American-Marietta Co.	219	R-2
American Metal Hose Div., The American Brass Co.	1911	R-5
American Metal Repair Assn.	1415	E-10
American Pamcor Inc.	1845	A-14
American Pullmax Co., Inc.	1516	C-9
The Anchor Packing Co.	1036	G-12
Appleton Electric Co.	2104	S-7
The Arco Co., Div. of American-Marietta Co.	219	R-2
Armco Drainage & Metal Products, Inc.	319	R-3
Armstrong Machine Works	1630	B-11
Arro Expansion Bolt Co.	1142	F-13
Arrow Saw Corporation	1723	B-10
Associated Research, Inc.	1309	E-9
The Autocall Co.	1322	D-10
Automatic Electric Sales Corp.	1138	F-13
Automation	610	L-2
B		
Ballymore Co.	1537	C-13
Band-It Co.	401	P-4
Barber-Colman Co.	431	S-4
Barnes & Jones, Inc.	1647	B-14
Barreled Sunlight Paint Co.	415	Q-4
Barry Controls, Inc.	512	K-3
W. M. Bashlin Co.	1531	C-11
The Bassick Co.	125	S-1
Beaver Pipe Tools, Inc.	1150	G-15
Bemis Bros. Bag Co.	714	K-1
Wm. Berrington & Son, Inc.	1350	E-13
Best Universal Lock Co.	1604	B-8
James G. Biddle Co.	2002	T-6
Bil-Jax, Inc.	1130	F-11
Binks Manufacturing Co.	1102	F-7
The Black & Decker Mfg. Co.	1233	F-12
Blackhawk Mfg. Co.	2016	Q-6
Boiler Equipment Trust	329	S-3
Boston Gear Works	1913	R-5
Bradley Washfountain Co.	425	S-4
W. H. Brady Co.	435	T-4
Breuer Electric Mfg. Co.	422	R-4
The Briggs Filtration Co.	1341	E-13
Buchanan Electrical Products Corp.	1455	D-15
A. M. Byers Co.	1720	A-10
C		
C & S Lighting Maintenance Co.	1521	C-10
Cadillac Glass Co.	108	P-2
The Phillip Carey Mfg. Co.	1527	C-11
Change-O-Matic Corp.	2118	Q-7
Chiksan Co.	704	M-2
Circle Clamp Corp., Cuyahoga Spring Co., a subsidiary of Republic Industrial Corp.	331	S-3
Cities Service Oil Co.	1030	G-11
Clark, Cutler, McDermott Co.	1903	S-5
Clark Door Co., Inc.	111	Q-1
Clarke Sanding Machine Co.	1020	G-10
Clements Mfg. Co.	231	S-2
Cleveland Worm & Gear Co.	312	Q-3
Cobra Metal Hose	423	R-4
Coffing-Hoist Div., Duff-Norton Co.	907	I-4
Collins Machinery Corp.	910	H-4
Colonial Plastics Mfg. Co.	1901	T-5
Commercial Filters Corp.	1215	F-9
Complete Reading Electric Co., Inc.	217	Q-2
Consolidated Chemical & Paint Mfg. Co., Inc.	2116	Q-7
Crawford Fitting Co.	1719	B-10
Cushman & Denison Mfg. Co.	1654	B-15
Cushman Motor Works, Inc.	1230	E-11
D		
D. L. Products, Inc.	126	S-2
Davey Compressor Co.	1538	C-13
Dazor Mfg. Corp.	1929	O-5
Dean Thermo-Panel Coil Div.	2014	R-6
DeLuxe Metal Furniture Co.	503	M-4
DeWalt Div., American Machine & Foundry Co.	1530	C-11
DeZurik Corp.	1241	F-13
Diamond Expansion Bolt Co.	1640	B-13
The Dilley Mfg. Co.	1517	C-9
The Joseph Dixon Crucible Co.	222	R-3
Dolin Metal Products, Inc.	1909	R-5
Dowel, Inc., Div. of Dow Chemical Co.	611	K-3
Doyle Vacuum Cleaner Co.	1526	C-11
Dresser-Ideco Co.	1642	B-13
The DuBois Co., Inc.	1652	B-15
E. I. duPont de Nemours & Co., Inc., Orchem Dept.	325	S-3
Duff-Norton Co.	907	I-4
Durametallic Corp.	1751	B-15
E		
Eagle Mfg. Co.	1535	C-12
The Eagle-Picher Co.	315	Q-3
Ebco Mfg. Co.	336	T-3
Electric Auto-Lite Co.	1609	B-9
Electric Cord Co.	2008	S-6
Electro Rust-Proofing Corp., subsidiary of Wallace & Tiernan, Inc.	707	L-2
Encyclopaedia Britannica, Inc.	407	P-4
Equipto Div. of Aurora Equipment Co.	318	Q-3
Eriez Mfg. Co.	306	P-3
F		
FACTORY	105	P-1
The Fairbanks Co.	430	S-4
The Farval Corp.	312	Q-3
Faultless Caster Corp.	1128	F-11
The Felters Co.	405	P-4
Fence Painter Div. of Fence Painter Corp.	1631	C-12
Fenway Machine Co., Inc.	1348	D-14
Fibercast Co.	1856	A-13
Filon Plastics Corp.	1247	F-14
Finnell System, Inc.	322	R-3
Flexonics Corp.	1331	G-11
Flex Angle Corp.	2112	R-7
Flodar Corp.	1344	D-13
Foundry	610	L-2
Fuller Co.	513	K-4
Furnas Electric Co.	1326	D-11
G		
The Garlock Packing Co.	2019	P-6
Gates Engineering Co.	1852	A-13
Geerpres Wringer, Inc.	710	L-2
General Electric Co.	1922	P-5
The Glidden Co.	612	K-2
The Globe Co., Products Div.	2022	P-6
Joseph J. Graciano Waterproofing Co.	1523	C-10
Gravely Tractors, Inc.	236	T-3
Greenlee Tool Co., Div. of Greenlee Bros. & Co.	1912	R-5
Grinnell Company, Inc.	2004	T-6
H		
Hallemite Mfg. Co.	1810	B-8
Hamilton Mfg. Co.	1641	B-13
Clifford B. Hannay & Son	2120	P-7
Harnischfeger Corp.	1335	G-12
Heil Process Equipment Corp.	1861	C-15
Hein-Werner Corp.	507	L-4
Helwig Co.	1511	C-9
Hild Floor Machine Co., Inc.	115	Q-1
Homestead Valve Mfg. Co.	2125	O-7
Hoover Ball and Bearing Co.	1025	H-10
A. C. Horn Co., Inc.	1148	F-14
E. F. Houghton & Co.	1914	R-5
Huntington Laboratories, Inc.	434	S-4
I		
Ideal Industries, Inc.	510	L-3
The Imperial Brass Mfg. Co.	106	P-2
Industrial East Co.	1038	G-13
Industrial Equipment News	1124	F-10
Industrial Hydraulic Lifts	1117	G-9
Industrial Maintenance and Plant Operation	607	L-3
Industrial Sweeper Co.	1144	F-14
Industrial Wiping Cloth Co.	601	N-3
Institute of Industrial Launderers	1243	F-14
Insto-Gas Corp.	116	Q-2
International Research and Development Corp.	1226	E-10
Iron Lung Ventilator Co.	501	M-4
J		
Jamesbury Corp.	1907	S-5
Johnson Bronze Co.	1505	C-8
The Johnson Corp.	1626	B-11
S. C. Johnson & Son, Inc.	1023	H-10
Joy Mfg. Co., Electrical Products Div.	118	Q-2
K		
Kaiser Aluminum & Chemical Sales, Inc.	912	H-4
Kalman Floor Co., Inc.	421	R-4
Kenco Pump Div., American Crucible Products Co.	508	L-3
Keystone Lubricating Co.	1635	B-12
Walter Kidde & Co., Inc.	1510	C-9

Turn the page



HI-TORQUE, **super-duty SKILSAW**—In-line rear handle and left-hand blade allows you to see line of cut. Exclusive hi-torque worm drive gives exceptional cutting power. Tough to stall anytime. Super duty saws with rear handle design come in eight models from 6½" to 12".

NEW HI-SPEED, **super-duty SKILSAW**—Completely new top-handle design for easy "swing-through" cuts. "Floating" blade guard and fast blade-change are exclusive new features. A total of 14 special features which add up to the most exciting new saw on the market today. Top-handle design available in 7¼" and 8¼" models.



ECONOMY-MODEL, **heavy-duty SKILSAW**—Designed specifically for all-around use by carpenters or contractors in residential construction. Lightweight. Versatile. All heavy-duty models feature exclusive "Vari-Torque" clutch. Protects against blade kickback. Keeps motor in top running condition. There are four heavy-duty models with blade sizes from 4¼" to 8¼".

WHICH SKIL SAW works best for you?

more proof of SKILMANSHIP*
ONLY SKIL MAKES ALL THREE

For more than 30 years SKIL has pioneered in the design of saws to meet the special needs of builders. Now, we offer the widest choice ever with the addition of a top-handle saw. Only from SKIL can you choose from three types. And remember this —no matter which model you buy, you always get the same superior performance that has made SKIL saw the favorite saw in the building field.

**SKILMANSHIP* is the ability to offer the finest portable saws for over 30 years—saws that do any job better, faster, easier.*

SKIL

Made only by SKIL Corporation, manufacturer of famous SKIL and SKILSAW products, 5033 Elston Avenue, Chicago 30, Illinois. In Canada: 3601 Dundas Street West, Toronto 9, Ontario.

Materials-Handling Made Easy

NØELTING

Faultless Casters

Give you many new ways to cut your handling costs

NØELTING **Faultless** Casters

These three Faultless Caster installations are examples of the versatility and broad scope of the Faultless line. Whether you want to move 50 pounds of delicate instruments or 15 tons of sheet steel, Faultless—the "Complete Line" backed by nearly three quarters of a century of caster-making experience—assures you the right casters to best do the job.

FREIGHT HANDLING
Series 900 and 9700 Casters enable one man to handle complete loading job. Loading time has been cut in half and shipments go out more speedily.

WORK SCAFFOLDS
Series C900 Caster with dual acting brake which locks both swivel and wheel action—combines stability, mobility and safety for work scaffolds.

V-GROOVED TRACK ASSEMBLY LINE
Series 600 Caster with V-grooved wheel eliminates ten handling operations in production assembly of refrigerator and freezer doors.

Ask your Distributor!

Your nearby Faultless Industrial Distributor maintains a substantial inventory of Faultless Casters for immediate delivery. He and one of the strategically located Faultless Sales Engineers are available to work with you on every handling problem in your plant. Both are listed in the phone book Yellow Pages, under "Casters," beneath the Faultless heading.

INDUSTRIAL DISTRIBUTORS — THE RIGHT HAND OF PRODUCTION

WRITE FOR FREE CONDENSED 20 PAGE CASTER CATALOG

Faultless Caster Corporation EVANSVILLE 7, INDIANA

Send Free copy of condensed 20 page Caster Catalog, 157-G

Name _____ Title _____

Firm _____

Address _____

City _____ Zone _____ State _____

For more facts Circle 506 on Reader Service Card

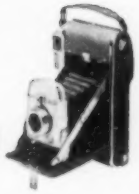
GUIDE TO EXHIBITORS

Begins on page 123

EXHIBITOR	BOOTH	MAP
Kimberly-Clark Corp.	504	M-3
Kirel, Inc.	136	T-2
Kollmann Mfg. Co.	417	Q-4
Koppers Co., Inc., Tar Products Div.	1425	E-11
The Korfund Co., Inc.	711	K-2
L		
Laduby Co., Inc.	1925	O-5
Lambert, Inc.	1615	B-9
LaSalle Steel Co.	402	O-4
The F. H. Lawson Co.	128	S-2
Walter G. Legge Co., Inc.	129	S-1
Lincoln Engineering Co.	2023	P-6
Lincoln Floor Machinery Co., Div. American-Lincoln Corp.	2122	P-7
Logan Co.	1451	E-14
The Lug-All Co.	1409	E-10
The Lunkenheimer Co.	2012	R-6
Luxo Lamp Corp.	2001	T-6
M		
Machine Design	610	L-2
MB Mfg. Co.	414	Q-4
Magnaflux Corp.	121	R-1
Maintenance Magazine	1009	H-9
Maintenance Products, Inc.	1703	B-8
Manheim Mfg. & Belting Co.	1311	E-9
Manpower, Inc.	1621	B-10
Martin Engineering Co.	227	S-2
The Martindale Electric Co.	107	P-1
The Master Builders Co.	219	R-2
McGill Mfg. Co., Inc.	1126	F-11
F. H. McGraw Co.	404	O-4
Mill & Factory	913	H-5
The Miller Co.	432	S-4
Millers Falls Co.	1356	E-15
Milwaukee Electric Tool Corp.	1624	B-11
Minneapolis-Honeywell Regulator Co.	2030	O-6
Modine Mfg. Co.	123	R-1
Morse Boulger Destructor Co.	1831	A-12
Motorola Communications & Electronics, Inc.	1916	Q-5
Muellermist Irrigation Co., Fanjet Roof Cooling Div.	1747	B-14
Multi-Clean Products, Inc.	1120	F-10
N		
National Cylinder Gas Co.	712	L-2
National Industrial Service Association, Inc.	1745	B-14
New Equipment Digest	610	L-2
New Hermes Engraving Machine Corp.	1619	B-10
Nordson Corp.	1045	H-13
O		
Oakite Products, Inc.	1904	S-5
O'Brien Mfg. Corp.	1547	C-14
Occupational Hazards & Industry & Welding	103	O-1

Turn the page

ADT *Automatic* Protection Guards 8 Polaroid Plants



makers of world-famous Polaroid Land Camera get greater security against

FIRE and BURGLARY and

SAVE $32,000 a year

Polaroid's Waltham, Mass. plant, selected by Factory as one of country's "Top Ten" for 1958. Photo taken with Polaroid Land Camera.

"Automatic protection for our eight plants in the Boston-Cambridge area has given us a high degree of security, with a saving of $32,000 a year in watch expense," says Edward Dubois, Supervisor, Building Services and Security.

Sprinklered, of course, the buildings are further safeguarded against fire by ADT Sprinkler Supervisory and Waterflow Alarm Service, which automatically summons the fire department whenever the system operates. This service also maintains a constant automatic check on shut-off valves and other water supply conditions.

All high-value locations are protected by burglar alarm service to summon police automatically in case of attack on doors, windows and other vulnerable points. Where necessary, ADT also automatically supervises steam pressure and various heating conditions. In all cases, ADT provides regular inspections, tests and complete maintenance of the equipment.

May we show you what ADT can do for you?

An ADT specialist will show you how the right combination of *automatic* services can save you money and give better protection to property, profits and employees' jobs. Call our local sales office if listed in your phone book or write to our Executive Office.

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Plant Maintenance & Engineering Show

Cleveland Auditorium

January 26-29, 1959

Neglected area of cost-control-opportunity uncovered by NEW BOOK

Guide to potential 4% profit increase makes Texaco book latest business best seller

Why you need it: The Texaco guide uncovers a new area where management can effect real economies in reduced maintenance costs. This is especially important now that decentralization and generally lower profit margins make the profit-and-loss statement the real measure of each plant unit's management efficiency.

What it will tell you: With facts like these, the Texaco guide shows that organized lubrication can raise production, extend parts life, and cut downtime:

★ **A metalworking manufacturer saved 315 man-hours per month through more efficient lubrication.**

★ **A major corporation anticipates substantial maintenance savings through the services of a lubrication engineer.**

★ **A mill has increased bearing life from 16 to 72 shifts by instituting systematic lubrication that insures the right lubricant for each machine.**

How it will help you: Only organized lubrication gives management such an opportunity for savings. For example, a 10% reduction in maintenance costs through better lubrication methods will increase profits up to 4% in the average plant – more than equivalent to a 4% increase in sales. And Texaco's new guide shows how it may be done.

How to get your copy: Simply fill in the coupon, attach it to your letterhead, and mail it to The Texas Company, 135 East 42nd Street, New York 17, N. Y.

THE TEXAS COMPANY
Dept. F-72
135 East 42nd Street
New York 17, N. Y.

TEXACO

Please send me Management Practices that Control Costs via Organized Lubrication.

Name_____

Title_____

GUIDE TO EXHIBITORS

Begins on page 123

EXHIBITOR	BOOTH	MAP
The Ohio Carbon Co.	122	R-2
Ohio Gear Co.	1027	H-11
The Ohio Injector Co.	1731	B-11
Ore-Lube Co.	1627	B-11
The Oster Mfg. Co.	914	G-5
Owens-Corning Fiberglas Corp.	1236	E-12

P

G. H. Packwood Mfg. Co.	1118	F-9
Pantex Mfg. Corp.	1920	P-5
Parker Sweeper Co.	1503	C-8
Patent Scaffolding Co.	2129	O-7
Penke-Hill Chemical Corp.	1625	B-11
Pennsalt Chemicals Corp., Corrosion Engineering Products Dept.	1352	D-14
Penton Publishing Co.	610	L-2
Permagile Corp. of America	1816	B-9
Permatex Co., Inc.	1766	B-16
Philadelphia Hoist, Div. of Industrial Enterprises	102	P-2
Phillips Drill Co.	909	I-5
Pittsburgh Coke & Chemical Co.	1908	S-5
Pittsburgh Corning Corp.	2123	P-7
Plant Engineering	302	P-3
Plant Publishing Co.	131	S-1
Polis Mfg. Co., Div. of Gregory Industries	1645	B-14
Pow-R-Safe, Inc.	2110	R-7
Proto Tool Co., Div. of Pendleton Tool Industries	232	S-3
Punch-Lok Co.	332	S-3
PurOlator Products, Inc.	120	R-2
Putnam Rolling Ladder Co.	1722	A-10

Q

Quaker Maintenance Co., Inc.	324	R-3
Quelcor, Inc.	1310	E-10
Quincy Compressor Co.	1237	F-13

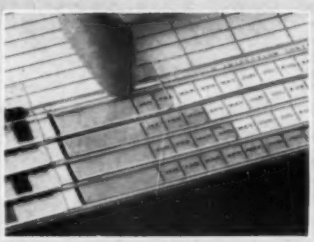
R

Ramset Fastening System	2103	S-7
Ranco Industrial Products Corp.	911	H-5
Rapids-Standard Co., Inc.	1735	B-12
The Rawlplug Co., Inc.	1524	C-10
Raybestos-Manhattan, Inc.	2119	P-7
Reed Manufacturing Co.	211	Q-2
Remington Arms Co., Inc.	1423	E-11
Remington Industrial Sales Div., Remington Arms Co.	1421	E-11
Renfroe Industrial Products, Inc.	1522	C-10
Reynolds Televator	1622	B-10
J. E. Rhoads and Sons	1357	E-15
J. A. Richards Co.	411	Q-4
The Ridge Tool Co.	904	I-3
Rohm & Haas Co.	2024	O-6
Rotolite Sales Corp.	2106	S-7
Royal Metal Mfg. Co.	424	R-4
Rudd, Melikian, Inc.	1242	E-13
Rust-Oleum Corp.	1650	B-14
Ruud Mfg. Co.	1033	H-12

Turn the page

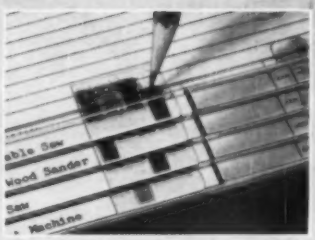
ACME VISIBLE

PREVENTIVE MAINTENANCE RECORD SYSTEMS CUT "DOWN" TIME



ONCE A MONTH

PROGRESSIVE signals, always visible, show the inspection schedule on a monthly basis. Various colors designate type of work to be done. When work is completed and entered on record card, signal is advanced to month in which next inspection is due.



ONCE A WEEK

LOCK-IN CHAIN signals . . . 4 windows each a different color, reveal the week within the month when inspection is to be made. With both month and week signalled, you avoid missing semi-monthly inspections or those requiring more frequent attention.

More and more, increased production depends on effective maintenance. The secret of successful Preventive Maintenance is accurate scheduling and rigid adherence to the schedule.

Acme Visible record equipment, with Acme hinged pockets and the two cards on one hanger feature, is ideal for follow-up control. Each machine and motor is listed on an individual card placed in the back of pocket—in facing pocket a "History of Repairs" record is placed, with signals *always visible*, to indicate the next inspection or lubrication date. "Spare Parts in Stock" record card is hung on the same hanger as pocket carrying "History of Repairs" card.

ACME VISIBLE RECORDS, INC.
CROZET, VIRGINIA

DISTRICT OFFICES AND REPRESENTATIVES IN PRINCIPAL CITIES

ACME VISIBLE RECORDS, INC. Crozet, Virginia

☐ Send us more information and literature on Preventive Maintenance.

☐ We are interested in Acme Visible equipment for _____ (KIND OF RECORD) records.

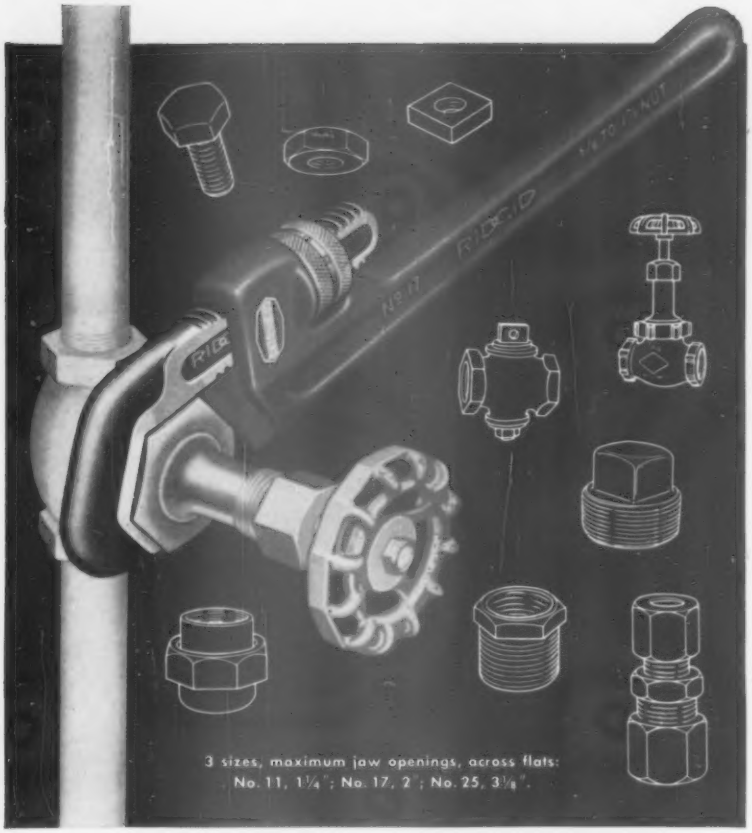
☐ Have representative call. Date _____ Time _____

Company _____ Attention _____

Address _____

City _____ Zone _____ State _____

FM-159



Master of Every Nut and Bolt...

NEW RIDGID®

Hex Wrench

Wide-open fast-action multi-sided grip on every hex, square and flathead!

"Got the RIDGID name on it?... Okay, I'll take it!"

Quick adjustment—stays to size . . . this new Hex Wrench goes on easily, won't slip off—harder you pull, the tighter it grips . . . no more skinned knuckles or rounded nut shoulders! Narrow jaw for close quarters. Famous RIDGID heavy-duty design, guaranteed housing, comfort-grip handle. Three sizes for ⅜" to 2" nuts. Make your work easier and faster — buy new RIDGID Hex Wrenches at your Supply House!

The Ridge Tool Company Elyria, Ohio, U.S.A.

THREADED PIPE... *It's Tight... It's Best... Costs Less!*

GUIDE TO EXHIBITORS

Begins on page 123

EXHIBITOR	BOOTH	MAP
S		
Safway Steel Products, Inc.	1730	A-11
Schroeder Brothers Corp.	1814	B-7
Scott Paper Co.	1807	A-9
Sellers Injector Corp.	1355	E-15
Shell Oil Co.	201	P-2
Simoniz Co.	1543	C-13
Simplex Wire & Cable Co.	228	S-3
Skil Corp.	2115	Q-7
A. O. Smith Corp.	1620	B-10
Eugene W. Smith	1725	B-11
Smithcraft Lighting	2114	R-7
Socony Mobil Oil Co., Inc.	1016	G-9
Solvent Service, Inc.	709	L-2
Speedi-Dri Div.	1520	C-10
The Spencer Turbine Co.	113	Q-1
Spray-On Products, Inc.	1108	F-8
Stahl Metal Products, Inc.	1715	B-9
Standard Dry Wall Products	135	T-1
Standard Industrial Products Co.	608	L-2
Standard Pressed Steel Co.	1104	F-8
Star Expansion Industries	1026	G-10
Steffan Mfg. Corp.	1704	B-7
Steiner Co.	511	L-4
Stewart-Warner Corp.	1603	B-8
Steel	610	L-2
Stratoflex, Inc.	1750	C-14
Structoglas Div., International Molded Plastics	2015	Q-6
Sugar Beet Products Co.	905	I-4
Sunroc-Telkee	1122	F-10
Swift & Co., Adhesive Products Dept.	2108	S-7
Swivelier Co., Inc.	215	Q-2
Sylvania Electric Products	609	L-3
T		
Halsey W. Taylor Co.	1557	C-15
Templeton, Kenly & Co.	205	P-2
G. H. Tennant Co.	604	M-2
The Texas Co.	2102	T-7
The Thomas & Betts Co.	335	T-3
Thomas Flexible Coupling Co.	1116	F-9
Thomas Publishing Co.	1124	F-10
The Thompson Electric Co.	1564	C-16
Thomas' Register of American Manufacturers	1124	F-10
Thor Power Tool Co.	1552	C-15
Titeflex, Inc.	2006	S-6
The Toledo Pipe Threading Machine Co.	1340	D-12
The Tool & Manufacturing Co.	124	S-2
Torit Mfg. Co.	1618	B-9
Towel & Linen Service Institute of Ohio	1743	B-13
Tranter Mfg., Inc.	2130	O-7
The Tremco Mfg. Co.	416	Q-4
Tropical Paint Co.	230	S-3
Turco Products, Inc.	1031	H-12
20 Mule Team Products Div., U.S. Borax & Chemical Corp.	112	Q-2
U		
Union Wire Rope Corp.	326	S-3
Unistrut Products Co.	1636	B-12
United Specialties, Inc.	224	R-3

Turn the page

GUIDE TO EXHIBITORS

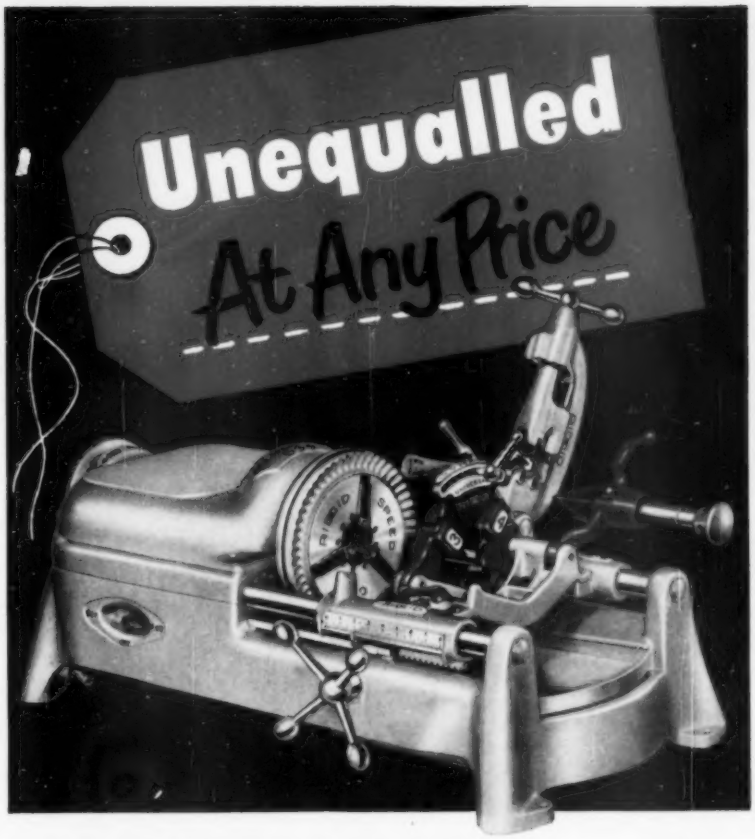
Begins on page 123

EXHIBITOR	BOOTH	MAP
U. S. Expansion Bolt Co.	1249	G-13
Up-Right Scaffolds, Div. of Up-Right, Inc.	1536	C-12
V		
Vac-U-Max Sales Corp.	1037	H-13
Valdura Div., American-Marietta Co.	219	R-2
Vanguard Engineering Co.	1525	C-11
Vanton Pump & Equipment Corp.	1515	C-9
Velocity-Power Tool Co.	1919	P-5
W		
Waco Mfg. Co.	1652	B-15
B. E. Wallace Products Co.	1502	C-7
Walworth Co.	1439	E-12
Watts Regulator Co.	1342	D-13
The Weatherhead Co.	1923	P-5
Weber Marking Systems, Div. of Weber Addressing Machine Co., Inc.	1553	B-13
Wells Mfg. Corp.	1029	H-11
West Chemical Products, Inc.	1808	B-9
Western Industries, Inc.	1551	C-15
Westinghouse Electric Corp.	202	P-3
Westline Products Div. of Western Lithograph Co.	328	S-3
Wheeler Mfg. Co.	1225	F-11
The Wilbur & Williams Co.	403	P-4
T. D. Williamson, Inc.	1042	G-14
Winnen Incinerator Co.	1860	A-15
Wisconsin Laboratories	429	S-4
Wise Engineering Co.	1554	C-15
The Witt Cornice Co.	132	S-2
Woodbridge Ornamental Iron Co.	1902	T-5
Wooster Products, Inc.	1324	D-11
X		
X-Four Corp.	1724	A-10
Y		
The Yale & Towne Mfg. Co.	1002	G-8
Yarnall-Waring Co.	2113	R-7

FACTORY's Newest

Below are listed reprints of FACTORY's latest plant-tested maintenance articles. Prices, 35¢ except as noted. Order from FACTORY Reader Service, 330 W. 42nd St., New York 36.

A148—18 Maintenance-Cost Checks
A157—4 Tips on Tool Maintenance
A158—16 Soft Spots in Your Maintenance Costs
A159—How to Audit Maintenance
A162—Electrical Management & Maintenance Practices Today (50¢)
A163—Maintenance Management Practices Today (50¢)



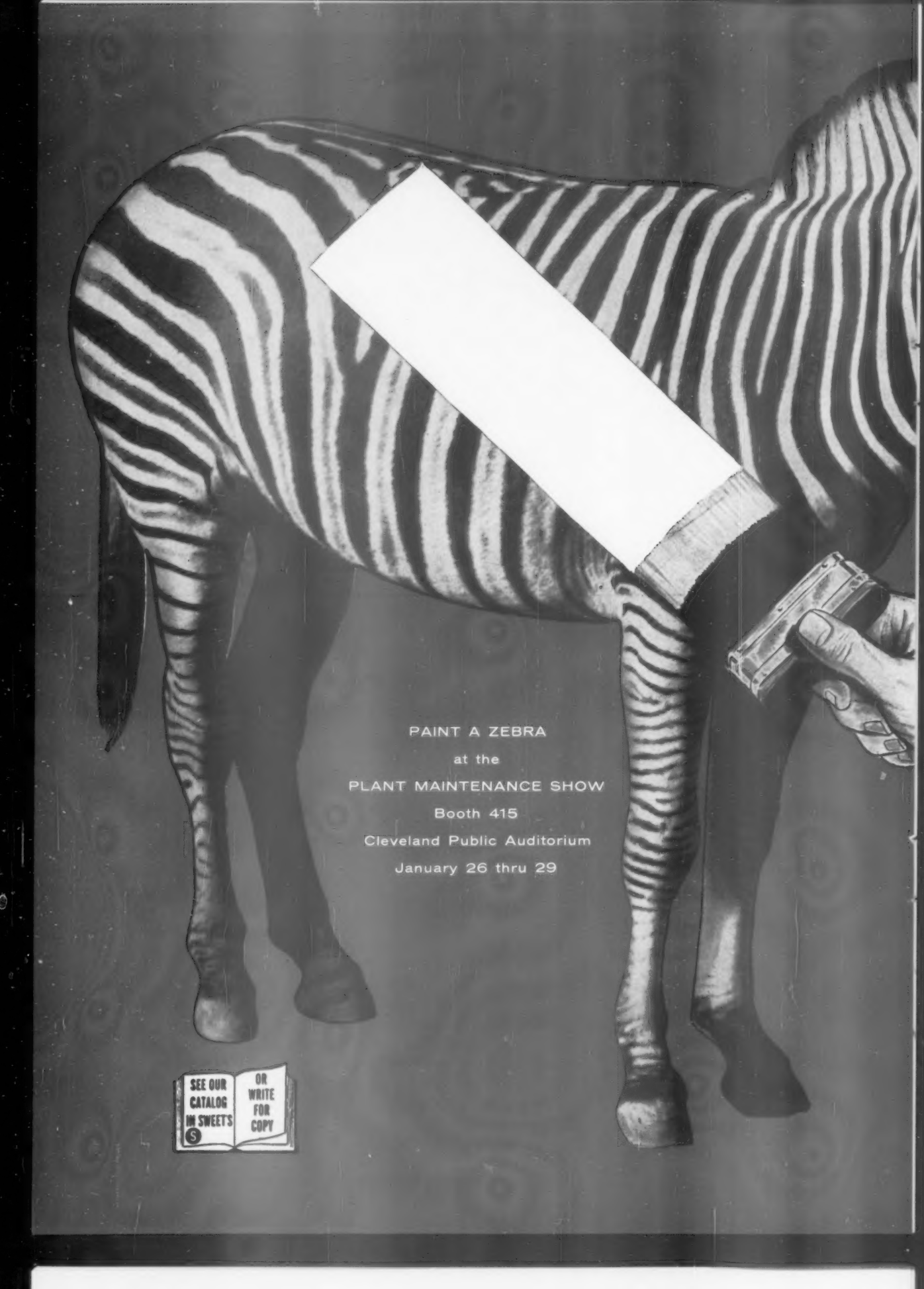
RIDGID No. 535

Pipe & Bolt Threading Machine
Complete with 1 Universal Die Head and 2 Sets of Dies, ½" to 2"...

Built like a machine tool, designed to thread, cut and ream with speed and ease no other machine offers you. Compare its slip-proof Speed Chuck, front chucking, instant size-change right in carriage, and many other RIDGID features. It pays you to see and try this most-for-your-money 535 at your Supply House before you decide.

The Ridge Tool Company, Elyria, Ohio, U. S. A.

For more facts Circle 511 on Reader Service Card


PAINT A ZEBRA
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Booth 415
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January 26 thru 29
SEE OUR CATALOG IN SWEET'S
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Barreled Sunlight® HIDING POWER

gives you one-coat paint coverage . . . lower "on-the-wall" costs!

This **zany zebra** reminds us of the "draw-down" charts used to measure the hiding power of paints. Both sport stripes which are tough to top!

Yet time after time, these draw-down tests demonstrate the superior hiding power of "Barreled Sunlight" Engineered Paint. Even under toughest test conditions, its unmatched opacity means solid, one-coat coverage . . . far fewer gallons to do the same job better. What's more, Barreled Sunlight paint is *engineered* to go on faster and easier to save on labor costs . . . *engineered* to resist weather, wear and washing . . . *engineered* to hold its color, finish, and "fresh-painted" look longer than any other paint you can buy and apply.

Why don't you prove the economy of Barreled Sunlight paint for yourself? Let an experienced Barreled Sunlight representative demonstrate its many cost-cutting qualities with a free "On-the-Wall" Test in your plant now.

Barreled Sunlight®

ENGINEERED *Paints*

FOR A BETTER LOOKING, LONGER LASTING PAINT JOB AT LOWER COST

For more facts Circle 513 on Reader Service Card

BARRELED SUNLIGHT PAINT COMPANY
2-A Dudley Street, Providence 1, Rhode Island

☐ Please have your representative call me to arrange a free "On-the-Wall" Test.

☐ Please send me your new "Quick Reference Guide" to Barreled Sunlight Paints.

Name.....

Company.....

Street.....

City..... *State*.....

GUIDE TO GOOD EATING

These Cleveland restaurants have been selected on the recommendations of a number of McGraw-Hill editors and salesmen who know their way around Cleveland and are thoroughly familiar with its eating places. You can assume that drinks are served in all restaurants listed unless otherwise noted.

DOWNTOWN'S BEST NINE

Cleveland Hotel—Rib & Roast Room. Public Square, TO 1-8000
Food, service, and atmosphere are tops. You'll like the baked potato with sour cream and chives. You get your own loaf of fine rye bread. Perfect roast beef. Cheese and crackers come with the cocktails.

Fred Harvey—English Oak Room
Union Terminal, PR 1-7373
Formal English dining with excellent service, food, drinks. Prices run up. Décor is just what name implies.

Jim's Steak House
1800 Scranton Rd., CH 1-4454
Popular steakhouse on the Cuyahoga River—a short cab ride from downtown. House specialty is the steak dinner with hashed brown potatoes, French fried onions, mushrooms.

Lucioni's Italian Restaurant
4213 Euclid Ave., HE 2-0660
Good restaurant, a short ride from Public Square. Moderate prices. Atmosphere and décor nothing special.

Monaco's
1118 Chester Ave., CH 1-1332
Good place to eat, but a little on the expensive side.

Rohr's
1111 Chester Ave., CH 1-1352
All-around restaurant. Take your pick of lobster, seafood, steaks, chops. Imported beer on tap for the undernourished.

Statler—Terrace Room
12th & Euclid Ave., PR 1-6800
Good food, service, and entertainment. The small orchestra is fine for dancing. But the bill runs up.

Stouffer's
14th & Euclid Ave., PR 1-1284
Very popular, well-run restaurant, serving fine food and drink. Waitresses are pleasant, prices moderate.

The Tavern
1027 Chester Ave., SU 1-5444
Old-world German restaurant in which the motif is carried out to the last *dankeschön*. Steaks cooked on an open charcoal hearth, served on glowing braziers. Food, drinks, and service are just as they should be.

OTHER DOWNTOWN SPOTS

Alpine Village
1614 Euclid Ave., PR 1-5550
Cleveland's only big-splash floor show—and the food is good. There's a 50¢ cover charge per person. Dinner prices run from $3 to $7.

Black Angus Restaurant
14th & Euclid Ave., CH 1-2281
Specializes in charcoal-broiled steaks—about $5. Dancing and entertainment in the El Toro Room (where they add a 20% luxury tax). Eat in El Toro, or slip in afterward.

Auditorium Hotel—Chalet Room
1315 East 6th, CH 1-5100
Close to Public Auditorium. Food very good; normal hotel atmosphere. Dining room is small, so better phone ahead. King-size cocktails.

Captain Frank's Seafood House
E. 9th St. Pier, PR 1-4900
Scampies are neither lobster nor shrimp, but taste like both. They come from India and are Captain Frank's specialty. There are other good menu items. No liquor.

Carter Hotel—Gun Room
E. 9th & Prospect, PR 1-7200
Recently redecorated and serving a general menu of good food.

Chef Hector
9th & Euclid Ave., MA 1-2976
A little Italian restaurant. Enter through an alley at 9th & Euclid.

Chinese Food Restaurant
3859 Superior, EN 1-9321
No schmaltz, but authentic Cantonese family-style dinners served at reasonable prices. Bone dry.

Clark Restaurants
241 Euclid; 9th & Huron; Hanna Building
Provide good food at reasonable prices—in a hurry.

Hickory Grill
929 Chester Ave., MA 1-6397
Good place to eat, general menu. Large steaks, excellent drinks.

Kornman's Cafe
1788 E. 9th St., CH 1-6651
Good food, with a wide range. Kornman's Back Room is small, smoky, active. Late at night, a pianist and vocalist emerge.

Pierre's
1524 Euclid Ave., SU 1-2226
Excellent food and service. Surroundings are subdued.

New York Spaghetti House
2173 E. 9th St., CH 1-9541
Like spaghetti? Here's your place.

Weber's
242 Superior Ave., NE.
CH 1-5176
Old German restaurant. If you enjoy imported beer, it's on tap here.

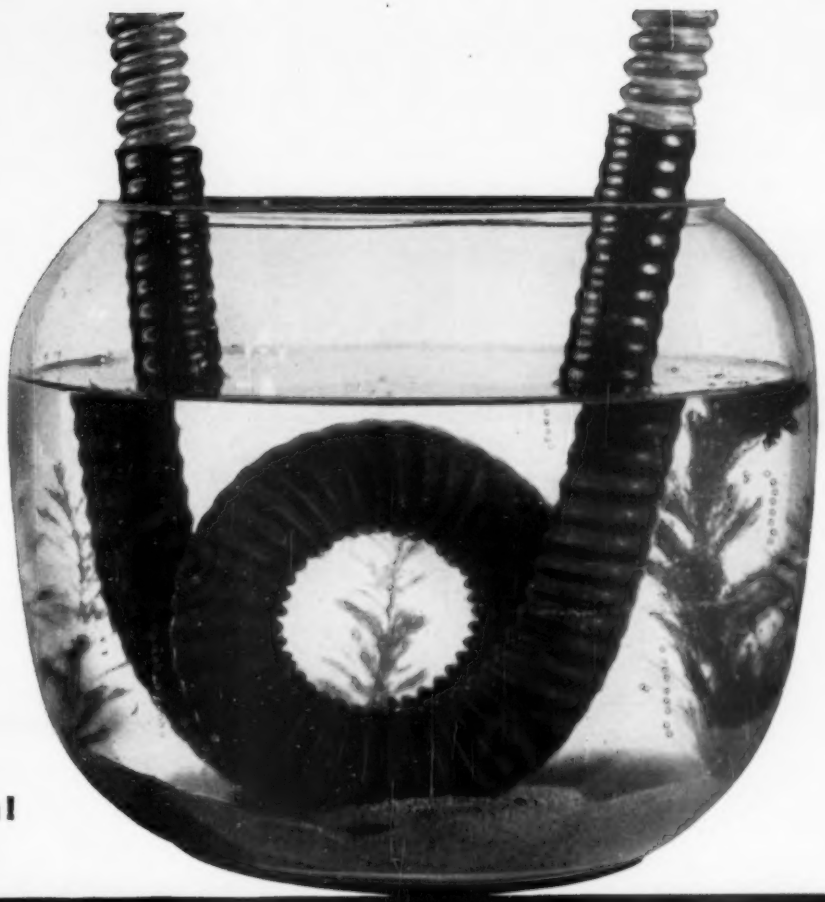
EAST'S NINE BEST

Alcazar Hotel
Surrey & Derbyshire, FA 1-5400
Good place to take your wife. Dancing and entertainment. Louisiana French atmosphere. Not for paupers. Cab fare: $1.65.

Caminati's
2775 So. Moreland, SK 1-4100
Italian restaurant serving a general menu. Atmosphere, food, service, and drinks are excellent. Décor in cocktail lounge upstairs is continental; more formal in main dining room downstairs. Cab fare: $1.80.

Damon's Restaurant
2466 Fairmont Blvd., FA 1-1900
Fine restaurant with a following. Nicely decorated but not plush. No liquor. Cab fare: $1.55.

Turn the page



...it must be
C-L-X*
cable sheath!

Simplex C-L-X is a Continuous Lightweight Exterior corrugated metallic sheath. It is a *completely enclosed and impervious* cable system that possesses lightness, strength and a pliability that is limited only by that of the Simplex ANHYDREX, Polyethylene, PLASTEX or varnished cloth insulated cable it contains.

C-L-X combines the advantages of lead sheathed and interlocked armored cables, yet its great mechanical strength and impermeability is achieved with very little weight.

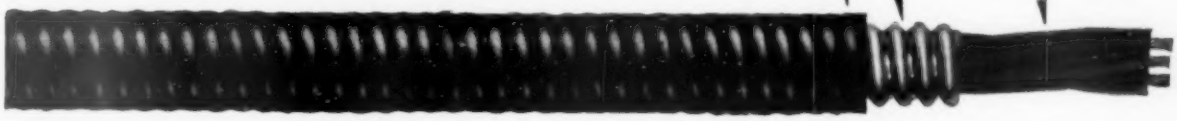
Countless installations over the past decade have proved the dependability and long life of C-L-X design — whether installed aerially or buried directly in the ground, or in trays.

*(Continuous Lightweight eXterior, pronounced "sealex")

Thermoplastic jacket may be color-coded for easy visual circuit identification or voltage ratings.

C-L-X continuous metallic sheath completely encloses the cable system.

C-L-X accommodates the Simplex built-in cable of your choice, for all kinds of power, control, signal and communication jobs.



LIVE BETTER ELECTRICALLY

Simplex WIRE & CABLE COMPANY

79 Sidney Street, Cambridge 39, Mass.

Visit Booth 228 — Plant Maintenance & Engineering Show

NEW!

2½-lb. Pressurized Dry Chemical

5-lb. Pressurized Dry Chemical

Kidde dry chemicals kill more fire faster!

Granted top rating by Underwriters' Laboratories, these two new Kidde dry chemical extinguishers pack the *extra* punch you need to knock out stubborn blazes. These 2½- and 5-pound Kidde units put out as much fire as eight and sixteen one quart carbon tetrachloride portables respectively. They are perfectly balanced for fast action, are light in weight, easy to operate even while wearing gloves. And — no pin to remove, no valves to turn, no inverting or bumping needed. Just aim at fire and press the lever! Pressurized, they can be easily and quickly recharged with air or nitrogen. No pressure cartridge needed. Write for more information on these new Kidde extinguishers — easiest-to-operate of all dry chemical portables.

Kidde (K Kidde)

Walter Kidde & Company, Inc.
132 Main St., Belleville 9, N. J.

Walter Kidde & Company of Canada Ltd.
Montreal — Toronto — Vancouver

VISIT KIDDE BOOTHS 1510-12 AT THE CLEVELAND PLANT MAINTENANCE SHOW, JANUARY 26-29

GUIDE TO GOOD EATING
Begins on page 134

Al Mahara's Steak House
8817 Wade Park Ave., RA 1-1300
Spanish name, but German atmosphere. Popular. Cab fare: $1.25.

Roman Gardens
12207 Mayfield Rd., GA 1-2700
Authentic Italian cuisine, well served in an Italian villa décor.

Shaker Steak House
3491 Warrensville Center
LO 1-9844
Good food, good atmosphere, excellent drinks and service.

Wade Park Manor
E. 107 & Chester, CE 1-3300
Plush colonial atmosphere—and the waiters don't forget you exist. Food is wonderful. Cab fare: $1.35.

Wagon Wheel—Chief Etienne
13114 Woodland Ave.,
LO 1-6900
Chief Etienne is a separate dining place downstairs in the Wagon Wheel. It's a legitimate French restaurant in all respects. Prices soar. Cab fare: $1.55.

Zephyr Room
16706 Kinsman, WA 1-4828
The Zephyr Room and your wife will like each other. Dancing from 9 pm. to 2 am. Cab fare: $2.05.

OTHER EAST SIDE

Coach House
Mayfield Rd., ER 1-3420
Good steak and chop house. Cab fare $1.35.

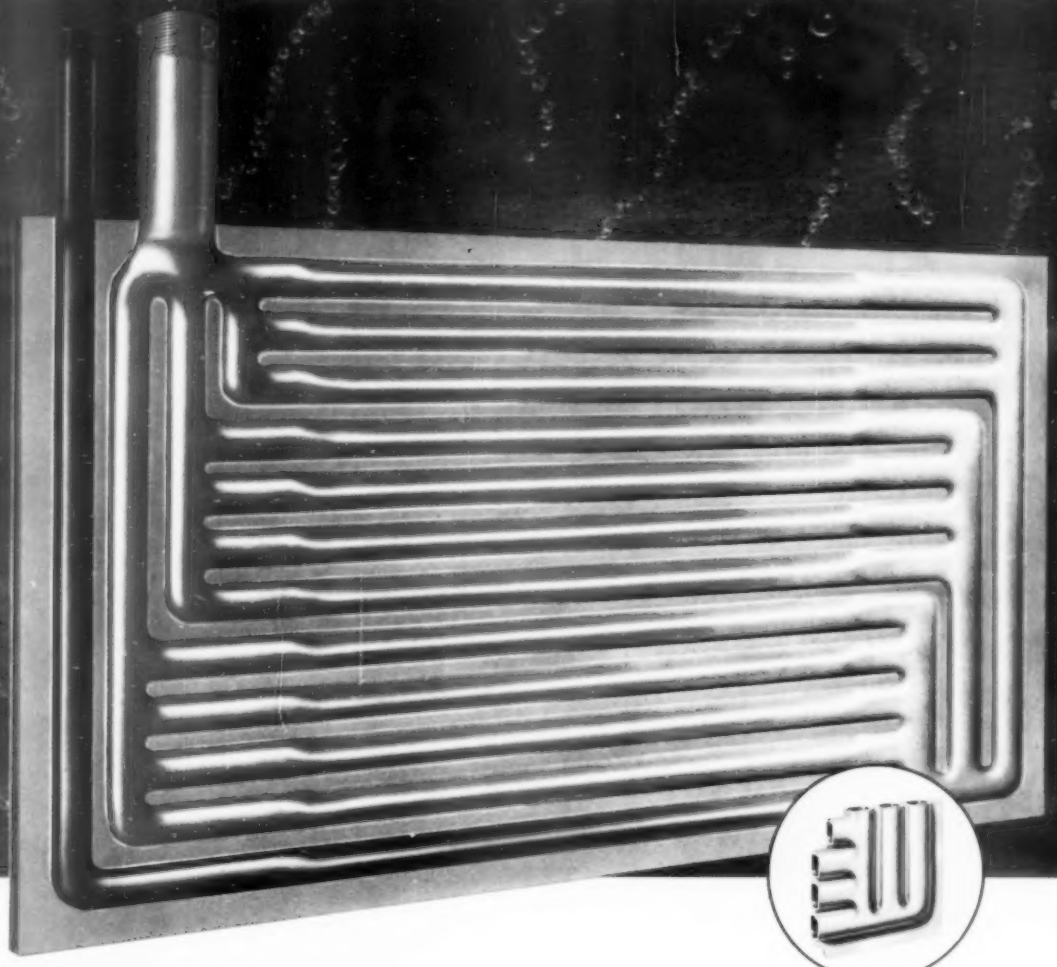
Frankie & Johnnie's
12511 Mayfield Rd., GA 1-9738
Unpretentious, highly recommended. Italian food. Cab fare: $1.55.

Gypsy Cellar
11000 Woodland, GA 1-9220
Hungarian restaurant reeking of old Budapest. Violin-playing Thursday, Friday, and Saturday. Wine only. Cab fare: $1.35.

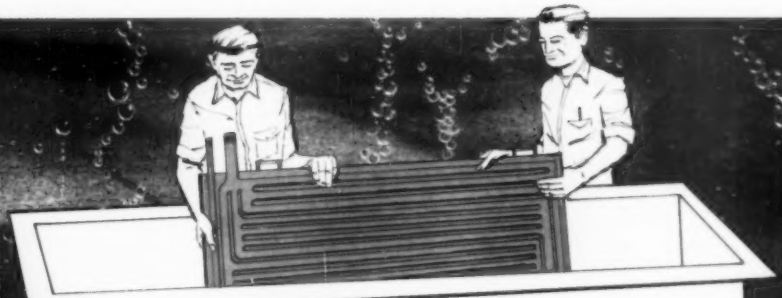
Jayson's Steak & Chop House
2066 Lee Rd., FA 1-1203
Kosher. Checkered tablecloths. Cab fare: $2.05.

Turn the page

For more facts Circle 515 on Reader Service Card For more facts Circle 516 on Reader Service Card ➤



NEW MULTI-ZONE PLATECOIL®



An exclusive Tranter advancement in heat transfer technology

OPERATING PRESSURES UP TO 250 psi

Now the cost and performance advantages of PLATECOIL can be gained in a new range of applications for which operating pressures up to 250 psi are required. Improved construction also provides a safety factor of over 5 to 1 at 250 psi.

FASTER START-UP

The new MULTI-ZONE design improves steam distribution and reduces "trapping." This results in a bonus of heat transfer. FREE-FLO action provides extra capacity to deliver when the coil is called upon to do so. Heat-up time after "shut-down" of tanks or processing vessels is held to a minimum. In cooling applications, the new MULTI-ZONE configuration of the passes permits unrestricted flow for maximum heat transfer.

BETTER TEMPERATURE MAINTENANCE

FREE-FLO action also assures an inherent reserve capacity to handle overload conditions. Fast recovery of required tank temperatures makes possible a new degree of process control under intermittent load and holds "down time" to a minimum.

REDUCED CORROSION

Mill-controlled TRANSTEEL . . . the mild steel with built-in corrosion resistance . . . plus DURAWELD bonding of the plates are new construction features introduced to cut corrosion and extend plate life.

NOW YEARS-AHEAD PERFORMANCE ...PROVEN ADVANTAGES OVER PIPE COILS

Increase tank capacity

Because PLATECOIL heat transfer capacity per square unit of surface is greater, the physical size of a PLATECOIL is much less than that of a pipe coil of comparable capacity. In most applications, it is actually possible to increase the work load capacity of a tank by replacing pipe coils with PLATECOIL.

Cut installation costs

Factory-fabricated PLATECOIL units eliminate the cost of engineering, cutting and assembling pipe coils. They are lightweight and easy to handle. Simple brackets and hangers supplied with the PLATECOIL units are pre-engineered and fabricated to add to the facility, speed and economy of installation.

Slash maintenance costs

PLATECOIL units have no threaded joints to corrode or leak. Connections can be located above the liquid level. Removal and cleaning are fast and easy with simple connections, "Quick Change" hangers and streamlined surface. In addition, deposits tend to form less readily on PLATECOIL than on pipe coils.

Simplify engineering

Through the use of available capacity and performance data, the engineering time normally consumed in specifying pipe coil requirements is greatly reduced.

Send for NEW Bulletin No. P60 for data on the NEW MULTIZONE PLATECOIL.

Tranter Manufacturing Inc.

LANSING 9, MICHIGAN

PLATECOIL®
DIVISION

GUIDE TO GOOD EATING
Begins on page 134

WEST SIDE

Cavoli Restaurant
W. 115 & Clifton, LA 1-8900
Originally gained its reputation as a rendezvous for Cleveland Indians and other ballplayers. Spaghetti is the specialty of the house. Steaks are excellent and fairly reasonable.

Kiefer's Restaurant
2516 Detroit Ave., CH 1-9544
An old-time German restaurant.

Kluck Bros. Tavern
1313 W. 117 St., BO 2-9765
German atmosphere with authentic *rathskeller* interior.

Tassi's Skyway
4998 Rocky River Dr., WI 1-1644
Buffet with moderate prices. Formal dining runs higher. Good food and entertainment. Across from airport.

PLACES TO EAT LUNCH

Selected because they are fairly close to the Public Auditorium or have quick service or both. The lunch crowd in Cleveland is at its peak from 12:15 to 12:30. Go earlier or later if you can.

Auditorium Hotel Coffee Shop
1315 East 6th St.

Black Angus Restaurant
14th & Euclid Ave.

Captain Frank's
9th Street Pier

Clark Restaurants
241 Euclid Ave.
9th & Huron
1007 Euclid Ave.

Colonnade Cafeterias
Bulkley Building
Leader Building Arcade
Hanna Building

Fred Harvey Restaurant
Union Terminal

Hickory Grill
929 Chester

Kornman's Cafe
1788 East 9th Street

Pierre's
1524 Euclid Ave.

Statler Hotel Cafe Rouge
12th & Euclid Ave.

Turn the page

Completely Modern!

The New

MULTI-CLEAN FLOOR MACHINE

14", 16" and 22" MULTI-CLEAN Floor Machines are similar to the Model MC-19 (19") Machine shown at right. MULTI-CLEAN Lite-12, 31", and Explosion-proof Machines are also available.

● Here's another MULTI-CLEAN engineering triumph . . . a complete new line of the world's *most modern* Floor Machines. Sleek . . . elegant . . . rugged . . . and champions in performance.

Beneath their graceful styling, these exciting and versatile new models offer mechanical features which are not available in any other machines on the market today.

Before you buy a floor machine for polishing, scrubbing, dry cleaning, waxing, buffing, sanding, grinding, or trowelling, it will pay you to investigate the savings and other advantages you will enjoy when you own a MULTI-CLEAN.

● Heavy, 3-conductor cable is detachable.

● Cable plugs into recessed receptacle in handle. No "pigtail."

● Handles have comfort grips; tapered back at natural, non-tiring angle for operator.

● Dual, independent acting switch levers give finger-tip control with *either* hand.

● 4-blade knife-type switch contains *more copper* than any other floor machine switch we know of . . . therefore switch failure is a rare occurrence.

● Handle "floats" or locks in any position from upright to horizontal. Regardless of handle position, machine stays in near perfect balance.

● Large stationary wheels make it easy to move from place to place, up and down stairs, over sills, etc. Axle supported at 4 points for maximum strength.

● Bumpers completely circle base and top.

● Special hand grips at front and rear facilitate carrying when necessary.

● Capacitor-start, induction-run motor. Twin capacitors provide maximum starting torque with minimum current. Reaches full operating speed almost instantly.

● *All ball bearinged* gear unit is designed and manufactured exclusively by MULTI-CLEAN for this purpose. 12 gear teeth in mesh at all times. Quiet, factory sealed, and lubricated.

● Can be converted into efficient scrubbing machine by addition of solution tank, controls, and channel feed brush.

For full details on MULTI-CLEAN Floor and Scrubbing Machines, call your local MULTI-CLEAN Distributor or write to MULTI-CLEAN Products, Inc., Dept. SE-63-78, St. Paul 16, Minnesota.

The combination of the right Multi-Clean Equipment and Materials with the correct procedure.

MAIL COUPON TODAY!

MULTI-CLEAN PRODUCTS, INC. Dept. FM-64-19
St. Paul 16, Minnesota

☐ Send information on MULTI-CLEAN Floor Machines.

Send information on scientific MULTI-CLEAN METHOD for: ☐ Asphalt tile; ☐ Concrete; ☐ Rubber tile; ☐ Gym Floors; ☐ Terrazzo, Oxychloride; ☐ Vinyl tile; ☐ Other (specify)_____

Name_____ Title_____

Address_____

City_____ Zone____ State_____

For more facts Circle 517 on Reader Service Card

SURVEY REPORTS SKIN DISEASE IS INDUSTRY'S NO. 1 HYGIENE PROBLEM

Here's What To Do About It In Your Plant

Recently, 2,177 major plants were surveyed by a market analyst to discover their No. 1 skin hygiene problem. The overwhelming majority of replies said: SKIN DISEASE.

The reasons for this answer:

—skin disease means costly medical treatment
—skin disease means prolonged absenteeism
—skin disease means worker dissatisfaction and compensation claims

What can you do in your plant to fight this problem? Call in an SBS skin cleanser representative. Most skin disease troubles can be traced to improper cleaning or use of the wrong cleaners. Your SBS representative is the man most completely equipped to study the situation and offer measures to improve it. He'll check all the conditions in your plant and recommend . . . not just a soap, but a *planned corrective skin hygiene program* for safe skin cleansing. Because Sugar Beet Products produces a *complete range of cleansers*, the SBS man can recommend the *exact ones* for your needs. Many famous firms are protected by SBS skin cleanser programs. Why not write us today? Dept. 58-A1.

the washword of industry

SBS sugar beet products co.

SAGINAW, MICH. • Los Angeles, Calif. • Newark, N.J
CANADA: Chemical By-Products, Ltd., Toronto, Ontario

GUIDE TO GOOD EATING

Begins on page 134

Stouffer's Restaurants
725 Euclid Ave.
14th & Euclid Ave.

The Tavern
1027 Chester

Tasty Shop
1612 Euclid Ave.

Theatrical Grill
715 Vincent

Weber's
242 Superior

BY CAR ONLY

Aurora Inn
Routes 82 & 306, AU 5555
It's about 30 miles but worth it. Colonial atmosphere.

Bagley's Dining Room
Chagrin Falls
A family restaurant, with many partisans. No liquor.

The Buckeye House
23135 Lorain Rd., RE 4-0188
Finest in prime steaks and Chateaubriand. It's a new restaurant, nicely turned out. Next door: new, deluxe Buckeye Motel.

The Cabin
28810 Lake Shore, WL 3-9804
A rustic retreat with a huge stone fireplace. Easy on the nerves.

The Danish Smorgasbord
Route 21, West Richfield
OL 9-9551
Charming home atmosphere, genuine smorgasbord. Moderate prices. No liquor.

Dranek's Astorhurst
Dunham & Tinker Creek,
BE 2-1338
Old World eating place with a full complement of devotees.

Gruber's Restaurant
20120 Van Aken Blvd.,
WA 1-0517
Gruber's can only be described as deluxe in all respects. Expensive, but worth every penny.

Hellriegel's Inn
Mentor, EL 4-9530
Excellent food for large appetites.

Turn the page

For more facts Circle 518 on Reader Service Card For more facts Circle 519 on Reader Service Card ➤

See us at the
PLANT MAINTENANCE
AND ENGINEERING SHOW
Cleveland—Jan. 26-29—Booth 1001

NEW Allis-Chalmers 2,000-lb Lift Truck

...a Standout Performer!

LET'S LOOK AT THE FACTS...

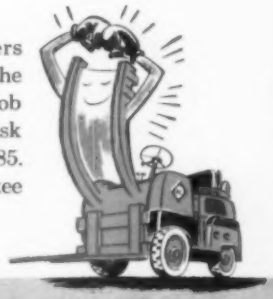
Greater Lugability— from a rugged heavy-duty industrial engine with full 35 hp, 97 ft-lb of torque.

Climbs a 40-percent ramp loaded. Power, traction, plus low center of gravity, add up to gradability that can't be matched.

Greater accessibility— ready for servicing in 22 seconds . . . and can be stripped down to the chassis in 22 minutes. Serviceability like this means many extra hours on the job.

Proven "Years-Ahead" design—means *more* dependable, continuous . . . economical hours on the job.

Ask your Allis-Chalmers dealer to demonstrate the NEW FT20-24 on *your* job under *your* conditions. Ask for the new Bulletin BU-485. Allis-Chalmers, Milwaukee 1, Wisconsin.



BH-82

ALLIS-CHALMERS

"Hefty" the FT 2,000-lb champ *Saves you more, Makes you more.*

"Get rid of that DUST!"

"The boss was sore and I was on the spot.

"He shoved the report from the efficiency engineer at me. I read it: 'Yearly loss due to machine wear, misalignment and down time . . . $3,000. Major cause . . . abrasive dust.'

"The boss pointed his finger at me, 'Get rid of that dust and get rid of it fast!' "

Now, it was my problem, and I was on the spot.

"First thing I did was to check into a central dust collecting system. But the lowest bid I could get was $8,000. Too much.

"Then I came across a Torit ad, offering economical portable dust collectors.

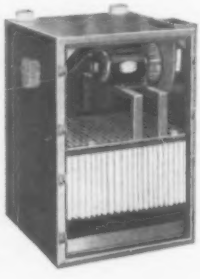
"Two days after my call Torit engineers showed me how in only one week they could install a portable, unitized Torit Dust Collector at each of our eight grinders, trapping dust right at its source—cleaning the air throughout the entire plant.

"Total cost? Only $2400.00. That's a $5,600.00 saving over the lowest priced central system.

"You guessed it—we installed the eight Torit Collectors."

Torit solved my problem

"This year when we received our report it read: 'Loss due to machine wear, misalignment and down time... $340.00.' A saving of $2,660.



"This time the boss was all smiles. He slapped me on the back, 'Charlie, you did a fine job getting rid of that dust. Frankly, I didn't think it could be done with such a small investment.'

"Now there's a pretty nice fellow to work for.

"If you've got a dust problem, or are about to have one, write the Torit people. They've manufactured and sold more dust collectors than anyone else in the U.S.A. Chances are they can help you the way they helped us."

TORIT manufacturing company

311 Walnut Street, St. Paul 2, Minn., Dept. 311

For more facts Circle 520 on Reader Service Card

GUIDE TO GOOD EATING

Begins on page 134

Kathe Kreuzer's
Avon, AV 4-8292
Good steaks.

The Lamplighter Inn
7068 Columbia Rd.,
Olmstead Falls, AD 5-4116
Excellent drinks, food, service. Worth the 45-minute drive. Home of the nostalgic musical organ.

Robinhood Inn
16026 Madison Ave., AC 1-4548
Excellent restaurant serving an archer's menu. Subdued atmosphere, desirable family restaurant.

The Saddle and Sirloin
Northfield and Emery Rds.
MO 3-5380
Just across from Cleveland's race tracks. Has horseflesh in the air, beef on the plate. Moderate prices.

Saddle Inn
Routes 2 & 6, Avon Lake 3-2101
Family-style dinners.

The Smorgasbord
Rt. 91 between Hudson & Stow
OV 8-8231
Recommended by The Gourmet Club. Copenhagen smorgasbord.

Town & Country Restaurant
16201 Kinsman, SK 2-1155
Excellent restaurant. Food, service, and drinks here are tops. A pianist keeps the air churning.

Westlake Hotel—Silverthorne Bar
19030 West Lake, ED 1-3000
Eight miles from downtown Cleveland. Excellent food and service.

The White Oaks
783 Cahoon Rd., TR 1-9873
Lounge, good food, gracious dining. Moderate prices. Half an hour from downtown Cleveland.

Ye Olde Stage House
Brecksville, JA 6-7244
Colonial restaurant, appetizing food. Waitresses in costume.

Young's American & Chinese
2172 Warrensville Center Rd.
FA 1-9676
Practically no atmosphere but good Cantonese family dinners.

MATERIALS-HANDLING NEWS

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

Many factors affect caster load capacities

Types of wheels, floor conditions, speed of travel must be considered in selecting casters. Bassick conservative load ratings protect users and are based on average operating conditions.

HARD VS. SOFT WHEELS

Soft rubber tread wheels protect floors but limit load capacity. Good rule of thumb is that soft tread wheels will carry half the load carried by a hard tread wheel of the same size. Where floor protection is desired, go to a larger size resilient tread wheel.

Your Distributor has New Products

These new or improved products developed by Bassick last year may aid materials-handling in your plant.

Light Duty Floating Hub caster shown above for loads from 50 to *150* lbs.

Rust-resistant Zinc plating on all Bassick formed steel truck casters . . . at no extra cost.

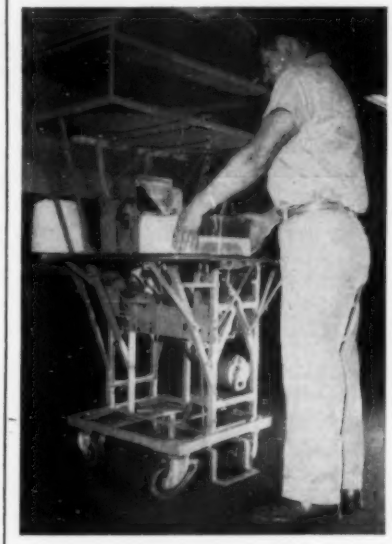
New improved "non-marking" composition Atlasite wheel almost as strong as steel, far kinder to floors.

Keeping you up to date on new product developments is one of many ways your local Bassick distributor can help you.

Semi-steel wheel where floor protection is unimportant
Improved Atlasite wheel won't mark floors, has high load capacity

Rough floors cut load ratings

Select a wheel large enough to ride over tracks, door sills, elevators, other obstructions. For rough floors or in areas where there are objects or debris on the floor, use a larger wheel with extra load capacity to secure proper ease of rolling and satisfactory performance. Two types of caster wheel are shown above.



Now it moves . . . Now it stands still

Sometimes it's convenient to move a machine to the job and then hold it steady in operation. R. R. Donnelly & Sons Company, a Chicago printer, solved the problem by putting this package-tieing machine on Bassick casters (for movement) equipped with combination wheel brakes and swivel locks (for standing still). Might be an idea here for you.

Speed and power affect carrying capacities

This heavy duty series "93" caster will support a static load of 80,000 lbs., but nothing like that load in action. Its rated carrying capacity, for normal slow movement of heavy equipment, is a conservative 10,000 lbs. or 15,000 lbs., for 8" and 10" sizes.

It is not designed to stand the strain of fast power pulled applications, however. These jobs, where speed may exceed 5 mph, normally call for a Trailer type of caster such as the Floating Hub swivel trailer caster rated at 500 to 1000 lbs. per caster.

D-1

INDUSTRIAL DISTRIBUTORS · THE RIGHT HAND OF PRODUCTION

THE BASSICK COMPANY
BRIDGEPORT 5, CONN.
IN CANADA:
BELLEVILLE, ONT.

Symbol of SW Excellence — Bassick — A DIVISION OF STEWART-WARNER CORPORATION

For more facts Circle 521 on Reader Service Card

UNISORB "200" LEVEL-RITE

MOUNT SPEEDS INSTALLATION, ABSORBS VIBRATION FOR OFFICE AND PLANT EQUIPMENT

Now . . . simple, fast and secure mounting — plus vibration control — for all types of light machinery and equipment with the new all-purpose UNISORB LEVEL-RITE® "200" MOUNT. Handles loadings up to 200 psi.

Look at these "200" features . . .

- Fast, simplified and precise leveling
- Free-floating screw post, compensates for uneven or pitched floors
- Safe, sure grip. Can be cemented if needed. No damage to floors, no bolting or lagging
- Exceptional vibration control — stops up to 85% of transmitted vibration
- Lowers noise level, reduces worker fatigue
- Machine can be moved at any time

Try this modern Unisorb Level-Rite "200" Mount now!
Send for complete details and order form today.

UNISORB 206 SOUTH STREET BOSTON 11, MASS.
Division of The FELTERS Company

Want more information? Send for set of Unisorb "Facts" Books!

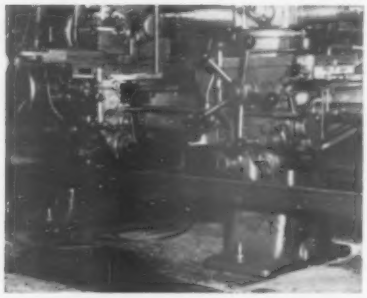
Please send me a Unisorb Sample and Free Book.

Company.....
Name.....
Address.....
City .....Zone .... State.....

FEB-44

Streamlined Mounting Methods Save Money, Speed Installation, Absorb Machinery Vibration

Whether it's a full scale move into a new plant, relocation of your production tools, or the installation of a new machine, the use of modern machine mounts can make everything go "slick as a whistle!" These modern mounts include the newer Unisorb Level-Rite All-Purpose Mounts and Unisorb Engineered Mounting Pads.



More and more companies are instituting "Unisorb Machinery Mounting Programs." This provides a pre-planned mounting system using right type and density of Unisorb and Unisorb Level-Rite for absorbing vibration and securing machine in place. Dake Corp., as shown above, also saved 70% in installation time with Unisorb.

It is possible to locate heavy impacting machines in general shop areas by mounting on Heavy-duty Unisorb. Approximately 85% of the transmitted vibration of this Bliss Punch Press is absorbed and there is no danger of "walking" or moving.

Because every piece of machinery has its own "vibration personality," load ratings and load distribution, it is necessary to select the right type and

density of machine mount for optimum machine performance and maximum reduction of vibration. The Unisorb line now makes this engineered selection possible. In addition, you can be sure that machines "stay put," even without bolts and lag screws, because Unisorb Cement provides a firm, unmovable bond.

The Unisorb method offers a happy solution to major machinery moving or installation problems. Prior to installation, the Unisorb Pads are cut to dimension according to machine type and numbered. Riggers then match pads to machines and install — no lost time, no problem with centering bolt holes or damaging floors. Unisorb Level-Rite Mounts provide even greater

This Cincinnati Brake is mounted on a Type "D" Unisorb. Critical levelling was preserved by Unisorb, which always insures that machines stay level, even within close tolerances. No bolts or lag screws are required.

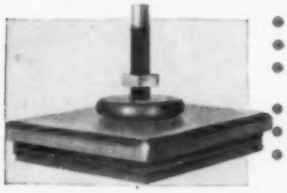
Unisorb is available in sheets and rolls which can be easily stocked and then cut to fit for each machine installation. This saves money and makes it easy to mount everything on Unisorb for maximum noise suppression, vibration control, speed and simplicity of installation.

streamlining and flexibility for machinery installation because they offer precise, positive leveling, elimination of grouting, secure compression gripping without cement, and immediate machine operation and mobility. Loading ranges are available from 175 lbs. per unit, up. Full details available from Dept. WCH, Felters Co., 206 South Street, Boston, Mass.

THE
2-IN-1
MACHINE MOUNT

• FAST, SAFE AND SIMPLE INSTALLATION
• MAXIMUM VIBRATION CONTROL

Unisorb gives you a complete line of vibration control machine mounts for simplifying machine and equipment installation everywhere in your plant. Unisorb pads, proven for over twenty years, are engineered to handle the "vibration personality" of different machine types and loadings. Unisorb Level-Rite combines the advantages of Unisorb pads with a precise, efficient leveling device that greatly simplifies all types of machine mounting. See how these features can help you in your plant.



- Absorbs up to 85% of transmitted vibration
- Eliminates bolts and lag screws, no floor damage
- Saves from 30 to 75% — by actual report — in installation time
- Machines can be moved at any time
- Lowers noise level, improves worker morale
- Protects machines from vibration, preserves building

TRY UNISORB ON SPECIAL TRIAL OFFER! Send us description of one machine you'd like to try on Unisorb. We'll send correct type and density. If not satisfied, return pads and we'll credit invoice. Available from leading Industrial Distributors; or write or call today.

UNISORB 206 SOUTH STREET BOSTON 11, MASS.
Division of The FELTERS Company

Want more information? Send for set of Unisorb "Facts" Books!

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Company.....
Name.....
Address.....
City.....Zone.....State.....

FEB-44

PRODUCTS EXHIBITED AT THE SHOW

PRODUCT **BOOTH**

ALARM, FIRE, AND COMMUNICATION SYSTEMS

American District Telegraph Co. **2107**
Automatic fire alarms, sprinkler supervisory and waterflow alarms, burglar alarm, photoelectric burglar alarm.

Walter Kidde & Co., Inc. **1510**
Fire extinguishers: Dry chemical*, pressurized water and loaded stream*, dry chemical wheeled*, soda-acid, foam, cartridge-operated water and pump tank, pump and pressurized vaporizing liquid, automatic and manual CO_2; automatic fire alarm system.

Korfund Co., Inc. **711**
Portable acoustical enclosure for communications systems*.

Minneapolis-Honeywell Regulator Co. **2030**
Ultraviolet flame detector.

Motorola Communications & Electronics, Inc. **1916**
Transistorized 2-way radio for materials-handling trucks; VHF pocket receiver and transmitter*.

BUILDING CONSTRUCTION MATERIALS

Acme Steel Co. **1227**
Steel floor plate, corner armor angle.

Armco Drainage & Metal Products **319**
Steel buildings, guardrail, corrugated metal drainage and sewer structures, underpasses.

Barber-Colman Co. **431**
Electric operators for overhead doors*, sliding doors*, and swinging doors*; wall panels*; electric operator control stations and switches.

Philip Carey Mfg. Co. **1527**
Built-up roofing, corrugated asbestos, cement roofing and siding, asbestos-plastic vapor barrier*, high- and low-temperature insulation, cements.

Clark Door Co., Inc. **111**
Automatic industrial and cold-storage doors, electric and air powered.

Dresser-Ideco Co. **1642**
Standardized steel buildings and their components.

* *Shown for first time*

Filon Plastics Corp. **1247**
Glass fiber reinforced plastic panels.

The Globe Co. **2022**
Safety grating, all-welded grating.

Kalman Floor Co. **421**
Concrete floor topping.

Logan Co. **1451**
Wire partitions, folding gates, spiral and steel stairs, pipe railings.

Master Builders Co. **219**
Non-shrinking grout, concrete, and mortar; colored and non-colored wear-resistant and corrosion-resistant concrete floor material; extra heavy-duty floor topping*.

Owens-Corning Fiberglas Corp. **1236**
Fire-resistant pipe and duct insulations, roof insulation, built-up roofing, glazing, flake lighting panel*, insulated sandwich walls.

Pittsburgh Corning Corp. **2123**
Cellular-glass and acid-resistant insulations and refractory material*.

Rohm & Haas Co. **2024**
Acrylic plastic for safety guards and similar applications.

Alan Wood Steel Co. **216**
Abrasive rolled-steel floor plate.

Woodbridge Ornamental Iron Co. **1902**
Spiral stairways.

BUILDING REPAIR MATERIALS

Philip Carey Mfg. Co. **1527**
Glass roof-repair system.

A.C. Horn Companies **1148**
Sealants, roofing products, floor hardeners, patching compounds.

Permagile Corp. of America **1816**
Masonry repair and restoration compounds; floor restorative*.

Standard Dry Wall Products, Inc. **135**
Materials for masonry maintenance, rehabilitation, and waterproofing.

Swift & Company, Adhesive Products Dept. **2108**
Floor and wall patch material, lagging adhesives, insulation adhesives and coatings.

Tremco Mfg. Co. **416**
Roof protection systems, roof aluminizer, abrasion-resistant seal for concrete and wood floors*, exterior masonry coating*, liquid polymer joint sealant, heavy-duty floor resurfacer, floor sealant, interior flat enamel, antiseptic treatment for walls and ceilings*.

Wooster Products, Inc. **1324**
Aluminum-alloy safety stair treads*.

CLEANING EQUIPMENT AND SUPPLIES—FLOORS

Advance Floor Machine Co. **1156**
Floor and rug cleaning machines, wet-dry vacuum cleaners, high-speed scrubber-vacuum machine*.

Breuer Electric Mfg. Co. **422**
Vacuum cleaners, portable blowers and cleaners, floor-scrubbing machines.

Clarke Sanding Machine Co. **1020**
Floor machines, heavy-duty wet-dry vacuum cleaners, self-propelled floor maintainers, power sweepers*.

Doyle Vacuum Cleaner Co. **1526**
Vacuum cleaners and attachments.

The DuBois Co. **1652**
Floor cleaners and finishes, metal-cleaning materials.

Eagle-Picher Co. **315**
Oil- and water-absorbent diatomaceous earth products including fillers, filter aids and aggregates*.

Finnell System, Inc. **322**
Gasoline and LPG scrubber-vacuum machines, combination scrubbing and vacuum machines, portable polishing and scrubbing machines, vacuum (wet and dry) mop trucks, steel-wool pads, waxes, finishes, soaps, powders, floor seals.

Geerpres Wringer, Inc. **710**
Mopping equipment, mop handles, mop wringers, mopping outfits; desk-mover.

Hild Floor Machine Co., Inc. **115**
Floor machines and vacuum cleaners; explosion-proof models also.

Huntington Laboratories, Inc. **434**
Silent floor machine*, industrial cleaners and equipment.

Industrial Sweeper Co. **1144**
Industrial sweeper.

S. C. Johnson & Son, Inc. **1023**
Wax finishes, cleaners, insecticides, floor machines, featuring germicide cleaner* and spray polish*.

Turn the page

INDEX TO OTHER PRODUCT LISTINGS

Cleaning equipment and supplies—general ..... p. 148
Contracted services ..... p. 148
Electrical equipment, parts, and supplies ..... p. 148
Furniture and storage equipment ..... p. 148
Health and safety equipment and supplies ..... p. 148
Heating, ventilating, and air-cleaning units ..... p. 150
Instruments for test, measurement, diagnosis ..... p. 150
Lighting equipment ..... p. 150
Lubricants and lubrication equipment ..... p. 152
Materials and supplies ..... p. 152
Materials handling equipment and parts ..... p. 159
Mechanical power transmission equipment ..... p. 159
Protective coatings, painting equipment ..... p. 160
Record and timing systems ..... p. 162
Scaffolds, ladders, and platforms ..... p. 162
Shop equipment and supplies ..... p. 162
Tools—hand ..... p. 164
Tools—portable power ..... p. 168
Utility and auxiliary equipment ..... p. 170
Valves, piping, and fittings ..... p. 172
Vibration mounts ..... p. 174
Washroom facilities and drinking fountains ..... p. 176

Industry Standard for Lower Maintenance Costs

QUALITY EQUIPMENT... DEPENDABLE SERVICE

Long accepted valve maintenance costs have gone down in thousands of plants where Lunkenheimer Valves are in service. This record is due partly to the high standards of quality and workmanship in the valves themselves. But just as important, it's due to the outstanding service performed by Lunkenheimer Distributors the country over. No matter how good the equipment you buy, it serves you best when it's backed by modern, dependable distribution methods. And that is exactly what you get when you rely on your Lunkenheimer Distributor. He maintains a highly-trained staff who make your maintenance problems their business. His job is to serve you . . . and he does it well. Call him. He will be glad to demonstrate the maintenance-saving benefits you receive when you install Lunkenheimer Valves.

LUNKENHEIMER QUALITY

LUNKENHEIMER®

THE ONE *Great* NAME IN VALVES

PRODUCT	BOOTH

CLEANING EQUIPMENT AND SUPPLIES—FLOORS (Continued)

Walter G. Legge Co., Inc. 129
Germicidal cleaner*, conductive coating, safety floor maintenance materials.

Lincoln Floor Machinery Co. 2122
Floor polishers and scrubbers, commercial-industrial vacuums.

Multi-Clean Products, Inc. 1120
Floor polishing and scrubbing machines, wet and/or dry pick-up vacuums, 14-in. floor machine*, concrete seals, floor cleaners, waxes.

Simoniz Co. 1543
Floor maintenance products.

Speedi-Dri Div., Minerals & Chemicals Corp. of America 1520
Oil, water, and grease absorbent.

G. H. Tennant 604
Vacuumized sweeper, power sweeper*, floor machines.

CLEANING EQUIPMENT AND SUPPLIES—GENERAL

Black & Decker Mfg. Co. 1233
Drum-type vacuum cleaner*.

Clements Mfg. Co. 231
Blower-suction cleaners, vacuum cleaners, hot or cold air blower.

Homestead Valve Mfg. Co. 2125
All-electric high-pressure steam cleaner*, high-pressure steam cleaner.

Ideal Industries, Inc. 510
Vacuum cleaners.

Kollmann Mfg. Co. 417
Sewer cleaners, sewer and drain cleaner*.

F. H. Lawson Co. 128
Dome-cover waste receptacle, dome top for 55-gal. oil drums.

Martindale Electric Co. 107
Portable blowers and cleaners.

Oster Mfg. Co. 914
Sewer cleaning machines.

Pantex Mfg. Corp. 1920
Steam-jet cleaners, steam generators, utility steam-jet cleaner*.

Quaker Maintenance Co., Inc. 324
Wall-washing machine, paint cleaner, cleaning pads.

Sellers Injector Corp. 1355
Hydraulic jet cleaners, rotor jet cleaners (tank cars and trucks), jumbo tank cleaners* (marine use principally).

Spencer Turbine Co. 113
Portable vacuum cleaners.

CONTRACTED SERVICES

C & S Lighting Maintenance Co. 1521
Lighting maintenance service.

Dowell Div., Dow Chemical Co. 611
Chemical cleaning for steam generators, piping systems, heat exchangers, process equipment, etc.

Joseph J. Graciano Waterproofing Co. 1523
Pointing, sandblasting, steam cleaning, waterproofing, concrete restoration, and calking.

Solvent Service, Inc. 709
Chemical and hydraulic services; cleaning, degreasing, pickling, passivating.

Westinghouse Electric Corp. 202
Electrical maintenance, repair service.

ELECTRICAL EQUIPMENT, PARTS, AND SUPPLIES

Appleton Electric Co. 2104
Heavy-duty electrical fittings; vaporproof connectors, couplings, junction boxes; explosion-proof fittings; roughing-in material; automatic take-up reel; liquid-tight junction box*; pulling elbow*.

Complete-Reading Electric Co. 217
Renewal parts for motors and controls.

Furnas Electric Co. 1326
Motor controls—magnetic starters and contactors; drum controllers; master, foot, and limit switches; pilot devices; pushbuttons; manual starters; illuminated pushbutton and push-to-test pilot light.

The Globe Co. 2022
Cable and tubing support.

Helwig Co. 1511
Carbon brushes, products, specialties.

Ideal Industries, Inc. 510
Wire connectors, commutator maintenance equipment.

Joy Mfg. Co. 118
Bench-type vulcanizer*, high voltage (7500-v.) portable connector*, "molded to cable" connectors.

Kaiser Aluminum & Chemical Sales 912
Aluminum service entrance and power cables, building wires, portable cords and cables, interlocked cables.

McGill Mfg. Co., Inc. 1126
Switches (canopy, toggle, momentary contact); sockets; portable lamp guards and lamp changers.

Ohio Carbon Co. 122
Anti-corrosion sealed shunt*; motor and generator brushes of carbon, graphite, and metal-graphite.

Owens-Corning Fiberglas Corp. 1236
Fiberglas electrical insulations.

Simplex Wire & Cable Co. 228
Wire and cable of all kinds.

A. O. Smith Corp. 1620
Electric motors.

Thomas & Betts Co., Inc. 335
Wire terminal kit*, compression connectors, liquid-tight connectors, disconnects, pig-tail connectors, interlocked armored cable fittings*, conduit fittings (E.M.T. and rigid) and connectors.

United Specialties, Inc. 224
Hose and cable reels*.

Westinghouse Electric Corp. 202
Motors, gearing, controls; spare parts.

FURNITURE AND STORAGE EQUIPMENT

Acme Steel Co. 1227
Slotted angle construction material*.

The Ajusto Equipment Co. 235
Adjustable chairs and stools.

DeLuxe Metal Furniture Co. 503
Unit for templets, patterns, gaskets, etc.; boltless steel storage shelving; vertical shelf filing unit; wardrobe, storage, combination and executive cabinets; bookcases; foreman's desk.

Equipto Div., Aurora Equipment Co. 318
Angle steel shelving, drawers*.

Dolin Metal Products, Inc. 1909
Mobile storage systems.

The Rapids-Standard Co., Inc. 1735
Slotted angle construction material*.

Standard Pressed Steel Co. 1104
Steel shop equipment and office furniture: adjustable shelving, workbenches, research and engineering stations; integral desk and drawing board*, stools, tool stands, stock carts.

HEALTH AND SAFETY EQUIPMENT AND SUPPLIES

Band-It Co. 401
Sign brackets*.

W. M. Bashlin Co. 1531
Safety belts, maintenance holsters, linemen's safety equipment.

W. H. Brady Co. 435
Accident-prevention signs; radiation hazard signs*; self-sticking warning stripes; pipe, wire and aisle markers; all-purpose numbers and letters; standardized lube labels*, hard-hat emblems*, standardized identification program*.

Change-O-Matic Corp. 2118
Work clothes dispensers.

Eagle Mfg. Co. 1535
Safety cans for volatiles.

Huntington Laboratories, Inc. 434
Insecticide*, urinal blockette*.

Logan Co. 1451
Wire window and machinery guards.

The Martindale Electric Co. 107
Protective masks and eyeshields.

Standard Industrial Products Co. 608
Smoker's dunking units.

Sugar Beet Products Co. 905
Skin cleansers, cream deodorant soap, waterless skin cleanser, cleaner-disinfectant-sanitizer-deodorant.

The Tool & Mfg. Co., Inc. 124
Plastic hand guard for use with chisels*.

20 Mule Team Products Div., U. S. Borax & Chemical Corp. 112
Powdered and lanolin hand soaps.

West Chemical Products, Inc. 1808
Cleaners, disinfectants, deodorants, insecticides and dispensers, liquid and powdered hand soaps, antiseptic soaps, paper towels; floor cleaners, sealers and waxes; and various products for control of dermatitis.

Westline Products Div., Western Lithograph Co. 328
Self-adhering safety signs and industrial signs; pipe, wire, and electrical markers; numerals, letters, and signs for bays, bins, racks, aisles; aisle markers; zinc chromate primer in aerosol; striped adhesive roll for hazardous areas.

Turn the page

* *Shown for first time*

Check your AIM*. . . Cloud Oak Flooring does . . .

Air-Powered Steelstrapper cuts unitizing time

Cloud Oak Flooring Company, Springfield, Missouri, with an assist from their Acme Idea Man, have speeded up the unitizing of bundled oak flooring by installing an Acme Steel A4 Pneumatic Steelstrapper. (Idea No. S3-48)

Acme Idea Man Al Boerner helps many companies streamline their *materials handling* operations.

Lengths of flooring, bundled into small units with an Acme Steel F1 Strapping Machine, are now more quickly and easily unitized into larger shipping packages with the fully-powered A4. The operator simply presses a control on the handle and strapping is tensioned. With another control on the same handle, magazine-fed seals are applied and strapping cut . . . *all automatically and by air power!*

Cloud Oak Flooring Company uses Acme Steel Strapping in all 3 steps of their shipping operations—from bundling to unitizing to bracing shipments in freight cars.

***Check your Acme Idea Man** for latest Idea methods and equipment. Write Dept. FAS-19, Acme Steel Products Division, Acme Steel Company, Chicago 27, Illinois. In Canada, Acme Steel Company of Canada, Ltd., 743 Warden Ave., Toronto 13, Ontario.

ACME STEEL **STEEL STRAPPING**

Super-tough resurfacer makes vulnerable spots stronger than new!

VALDURA EPO-SURFACER

Damage to costly machined parts can result from cracks in concrete floors. Epo-Surfacer prevents this as well as skidding in slippery areas.

To apply, merely clean surface and use screed bar and trowel to spread. Hardens quickly. Recommended minimum thickness is ⅛ inch.

Newest addition to the famous Val-Chem Line, Valdura Epo-Surfacer is a 100% solids epoxy product that simplifies patching and resurfacing of concrete, wood and metal surfaces. A relatively thin coating of Epo-Surfacer will effectively patch any crack in a concrete floor—adhere better than concrete and give a stronger surface than the original. Epo-Surfacer is impervious to alkalis, acids and solvents... can be feathered to a thin film... provides slip-proof protection for tank cars, truck floors, stairs and ramps. For a FREE trial in *your* plant—applied by a Valdura Representative, if desired—fill out coupon below and mail it today!

VALDURA PAINTS THAT ENDURE

FREE

Contact us about patching an area in our plant, not exceeding 15 square feet, with Valdura Epo-Surfacer—at no charge to us.

VALDURA HEAVY DUTY PAINT DIVISION
AMERICAN-MARIETTA CO.
101 E. Ontario St., Chicago 11, Illinois

NAME_____

COMPANY_____

CITY_____ STATE_____

See Valdura Epo-Surfacer Demonstrated at Booth No. 225

PRODUCTS EXHIBITED

Begins on page 146

PRODUCT	BOOTH

HEATING, VENTILATING AND AIR CLEANING UNITS

Aget Mfg. Co. 1251
Dust and mist collectors.

American Air Filter Co. 1545
Dry centrifugal dust collector, electronic oil mist collector*, acid mist and vapor collector*.

Grinnell Co., Inc. 2004
Unit heaters.

Heil Process Equipment Corp. 1861
Plastic axial and centrifugal fans, corrosion-resistant fume scrubbers.

Iron Lung Ventilator Co. 501
Roof ventilators, roof exhausters*.

Modine Mfg. Co. 123
Propeller-type steam and hot-water unit heaters, heating and ventilating units*, propeller and blower gas heaters.

Owens-Corning Fiberglas Corp. 1236
Fiberglas duct systems, air filters, filter media.

Quelcor, Inc. 1310
PVC fume scrubber.

Torit Mfg. Co. 1618
Cloth-filter and centrifugal dust separators; radial-blade fan wheels.

INSTRUMENTS FOR TEST, MEASUREMENT AND DIAGNOSIS

James G. Biddle Co. 2002
Dielectric test sets; megger insulation and low-resistance testers; megger ground testers; reed-type frequency meters and tachometers; speed-measuring instruments and rheostats; cable fault locator and motor rotation tester set.

Complete-Reading Electric Co. 217
Specialized electrical maintenance tools and equipment.

International Research & Development Corp. 1226
Portable vibration meter, analyzers*.

The Korfund Co., Inc. 711
Portable and reed instruments for measuring vibration*.

Magnaflux Corp. 121
Portable ultrasonic thickness measuring instrument*; testing kits for magnetic particles, fluorescent-particle penetrants, and dye penetrants*.

Martindale Electric Co. 107
Circuit testers; ammeters; watt-, volt-, power-factor-, and ohmmeters.

MB Mfg. Co. 414
Vibration meter and pickup.

Minneapolis-Honeywell Regulator Co. 2030
Electronic temperature controllers.

LIGHTING EQUIPMENT

American Dryer Corp. 1851
Emergency lighting units.

Appleton Electric Co. 2104
Indoor and outdoor lighting units; vaporproof lighting fixtures.

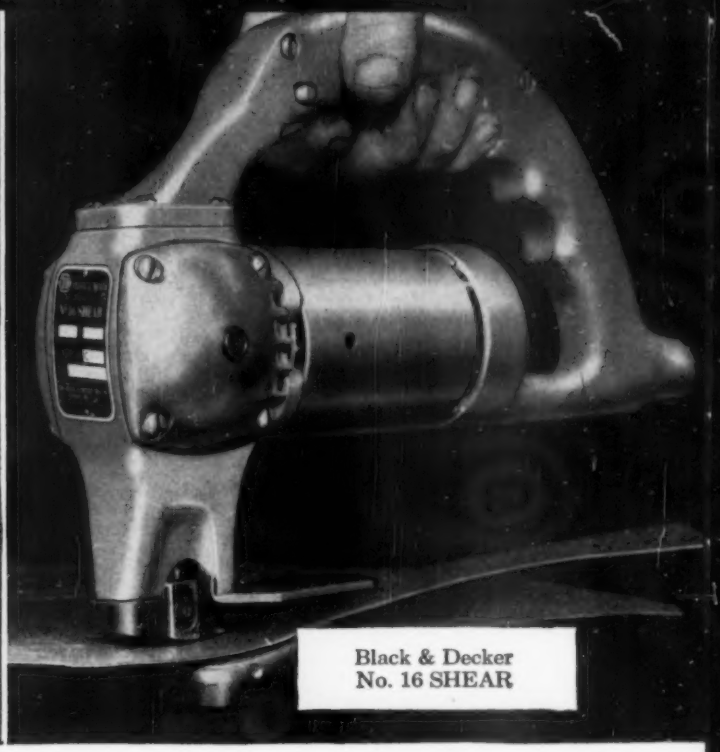
* *Shown for first time*

Turn the page

For more facts Circle 526 on Reader Service Card

For more facts Circle 527 on Reader Service Card ➤

Black & Decker
No. 16 NIBBLER



Black & Decker
No. 16 SHEAR

Slash metal cutting costs with speedy B&D Tools!

Faster, lighter, easier handling, POWER-BUILT and packed with features

Whether you need the speed of shears or the more precise performance of nibblers—you'll find a lot to like in the easy handling Black & Decker No. 16 Shear and No. 16 Nibbler.

By actual test, they're faster and longer-lived—dramatically cut costs. Their lighter weight means easier handling—centrifugal fans give cooler running. Each has exclusive construction features to stand up under the shock of sheet metal cutting.

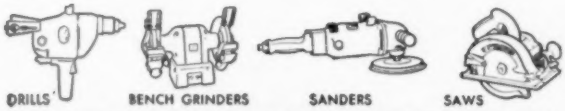
Try these new tools at your nearby Black & Decker distributor. There's a No. 12 Shear, too, for heavier work. For full details on new features, write to: THE BLACK & DECKER MFG. CO., Dept. 0701, Towson 4, Maryland. (In Canada: Brockville, Ontario.)

Look Under "TOOLS-ELECTRIC" in Yellow Pages

Leading Distributors Everywhere Sell

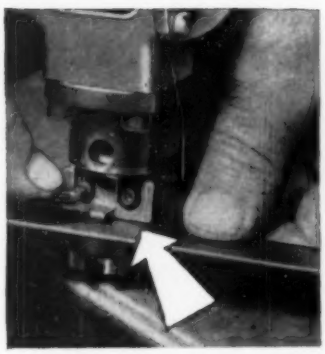
B&D Black & Decker®

Portable Electric Tools—Power-Built to set the pace



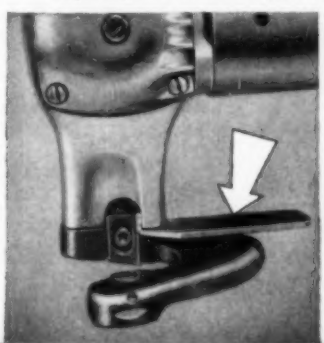
DRILLS BENCH GRINDERS SANDERS SAWS

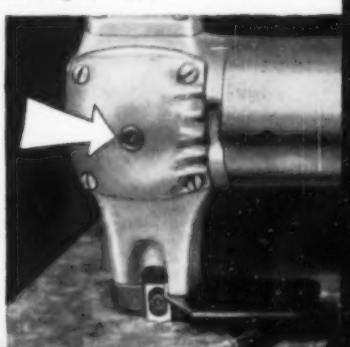
See and try new B&D tools at the Plant Maintenance & Engineering show, booths 1233 to 1235

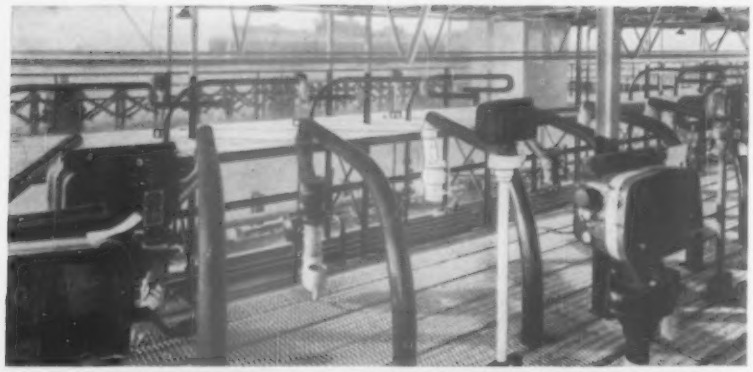


UP TO 3 TIMES FASTER than competition, new B&D Nibbler has twice the life, 20-30% less weight, reversible punch. Adjustable stripper plate (left), smaller diameter (right) are extra features.

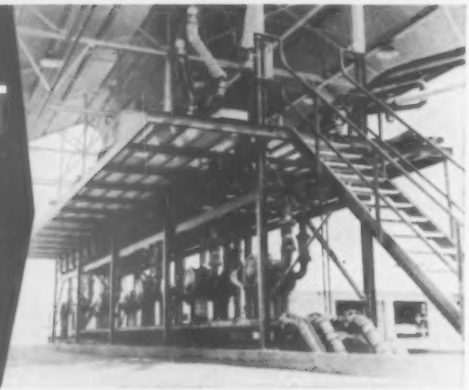
50% FASTER than competition, new B&D Shear has one-third less weight than closest competitor, lasts much longer. Deflector plate prevents curling of material. Adjusting screw allows quick positioning of blade.

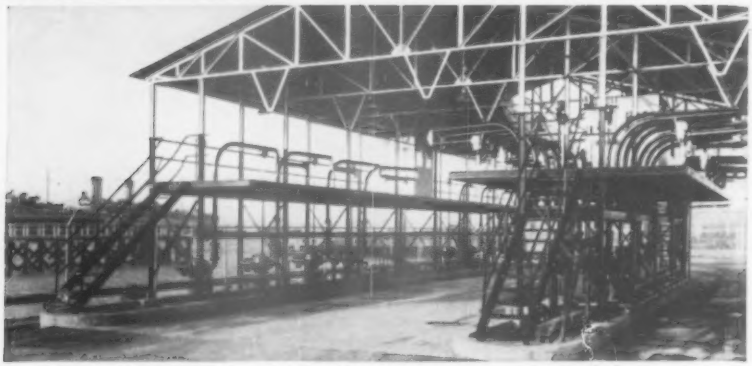






Use Safety
GRIP-STRUT
grating
for a safe footing on stairs and platforms

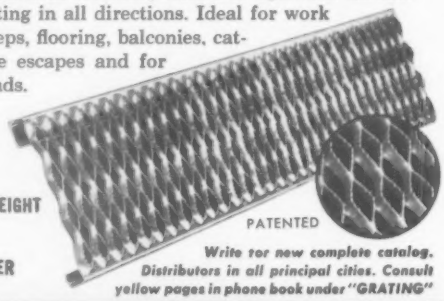




SAFETY GRIP-STRUT is the new basic material, all in one piece (including channels), not welded, riveted or expanded in steel or aluminum, in standard sizes and gauges. Safety GRIP-STRUT presents an open space, in a diamond pattern, in excess of 55% of the area for ready access of light and air and gives a positive NON-SKID footing in all directions. Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

Important Safety Features

- FIRE PROOF
- SLIP PROOF
- MAXIMUM STRENGTH
- MINIMUM WEIGHT
- EASY TO STAND ON
- COOL IN SUMMER — WARM IN WINTER



Write for new complete catalog. Distributors in all principal cities. Consult yellow pages in phone book under "GRATING"

107

GRIP-STRUT
PRODUCTS DIVISION
The GLOBE *Company*
4014 S. PRINCETON AVE., CHICAGO 9, ILL.

PRODUCTS EXHIBITED

Begins on page 146

PRODUCT — **BOOTH**

LIGHTING EQUIPMENT (Cont.)

C & S Lighting Maintenance Co. 1521
Fluorescent fixture cleaning tank.

Dazor Mfg. Corp. 1929
Fluorescent and air-cooled incandescent floating lamps; air-cooled incandescent adjustable-arm lamps; flexible- and swing-arm lamps; floating magnifiers with fluorescent lighting for machining, inspection, small assembly, etc.

Electric Cord Co. 2008
Automatic emergency lighting, waterproofed and hermetically sealed.

Luxo Lamp Corp. 2001
Work, portable, incandescent, fluorescent, desk, and inspection lamps; lighting fixtures; etc.

Sylvania Lighting Products Div., Sylvania Electric Products, Inc. 609
Mercury vapor lamps*, VHO fluorescent lamps, incandescent lamp bulbs, fluorescent tubes, panel lamps, fluorescent fixtures, group replacement program.

LUBRICANTS AND LUBRICATION EQUIPMENT

Alemite Div., Stewart-Warner Corp. 408
Lube guns, pumps, and transfer pumps; air-operated trolley-conveyor lubricator; airline control (air oiler, moisture separator, pressure control); centralized and miniature centralized lubrication systems; large air-operated lube pumps*.

Cities Service Oil Co. 1030
Oils, greases, lubricants.

The Joseph Dixon Crucible Co. 222
Spray-on lubricating graphite, cartridge-loading lubricating gun.

Eagle Mfg. Co. 1535
Oilers; oil, gasoline containers.

The Farval Corp. 312
Centralized lubrication, lubricating equipment.

E. F. Houghton & Co. 1914
High-temperature grease; additive for hydraulic systems; airline lubricant.

Lincoln Engineering Co. 2023
Lubricant pumps*, airline accessories*, centralized lubrication pump*.

The Lunkenheimer Co. 2012
Lubricating devices.

Permatex Co., Inc. 1766
Graphite grease.

Shell Oil Co. 201
Multipurpose high-temp. lubricant.

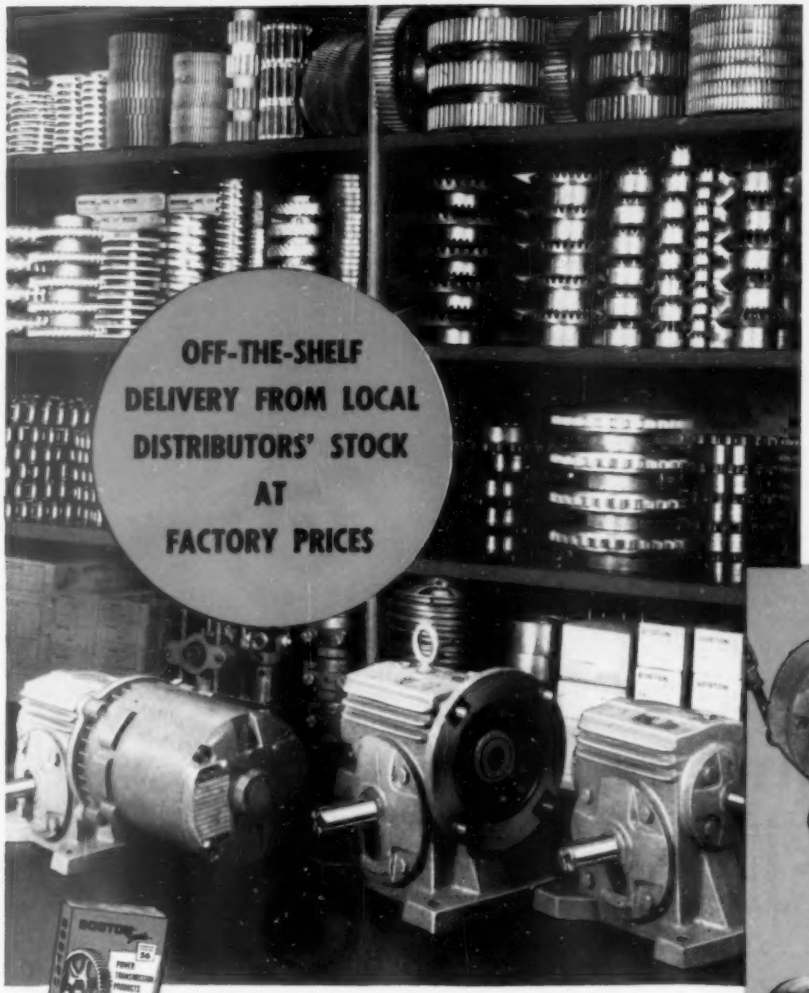
The Texas Co. 2102
Industrial lubricants, cutting and grinding fluids, rustproof compound, lubrication program.

MATERIALS AND SUPPLIES

The Anchor Packing Co. 1036
Packings, mechanical rubber goods, asbestos products.

* *Shown for first time*

Turn the page



Catalog lists 7124 Standardized Products

STOCK GEARS • SPROCKETS and CHAIN • SPEED REDUCERS
BEARINGS • PILLOW BLOCKS • COUPLINGS • PULLEYS

You simplify planning. Select all the parts you need from one source – the Boston Gear Catalog.

You save time and expense. Order from your Boston Gear Distributor for off-the-shelf delivery. Why wait (and pay more) for parts "made-to-order?"

You get top-rated performance. Compare the quality and service life. You'll agree Boston Gear products set the highest standards.

Your Boston Gear Distributor is fully qualified to help you get the maximum benefits from standardization – in lower costs, in simplified servicing. Boston Gear Works, 62 Hayward St., Quincy 71, Mass.

Visit Booth No. 1913
Plant Maintenance and Engineering Show

CALL YOUR BOSTON Gear DISTRIBUTOR

For nearest Distributor LOOK UNDER "GEARS" in the 'Yellow Pages'

INDUSTRIAL DISTRIBUTORS THE RIGHT HAND OF PRODUCTION

Remember — STANDARDIZATION PAYS —®

For cost-wise TRANSMISSION design and maintenance ECONOMY

STANDARDIZE **on BOSTON Gear**

NEW

For SHAFT MOUNTING or BASE MOUNTED to meet any drive condition

BOSTON Gear OPTIMOUNT TRADEMARK

HELICAL GEARED REDUCTORS RATIOMOTORS AND FLANGED REDUCTORS

Call your Distributor for complete information. Ask for Catalog OP-1.

SINGLE or DOUBLE REDUCTION
⅛ to 15 HP drives **66 models**

FROM STOCK!

SPENCER Vacuum

Assembly and Gaging Dept., Miniature Precision Bearings, Inc., Keene, N. H.

KEEPS "WHITE ROOMS" WHITE

Dirt and dust are strictly bad news around gaging or assembly areas of a company producing precision ball bearings. Every possible precaution must be taken to assure an absolutely dust-free atmosphere in the "white rooms".

That's why, at plants like this modern Miniature Precision Bearings, Inc. factory, you'll find SPENCER vacuum cleaning systems providing *sure* sanitation.

Whether your cleanliness requirements are critical . . . or whether *convenience* and *economy* of maintenance are primary, you'll find a SPENCER system the answer to your needs.

Write for complete information on SPENCER installed vacuum cleaning systems or request a piping layout to meet your particular requirements.

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

OTHER QUALITY SPENCER PRODUCTS

PORTABLE VACUUM CLEANERS

PNEUMATIC CONVEYING SYSTEMS

BLOWERS

PRODUCTS EXHIBITED

Begins on page 146

PRODUCT — **BOOTH**

MATERIALS AND SUPPLIES (Cont.)

Band-It Co. 401
Pressure clamps, hose nipples, hose menders, hose-nipple pushers, clamping air tools.

A. M. Byers Co. 1720
Abrasion-resistant steels.

Cushman & Denison Mfg. Co. 1654
Felt tip pen, throw-away felt-tipped marker, line marker*.

Diamond Expansion Bolt Co. 1640
Machine-bolt shields*; lag screw shields; anchors for machine screws, wood screws and masonry nails; spring toggle bolts, carbide masonry drills, pipe straps and cable clamps, and anchors for hollow walls and doors.

The DuBois Co. 1652
Paint-stripping materials and paint-booth materials.

Durametallic Corp. 1751
Mechanical seals, flexible metallic packings, oil pressure systems.

Fence Painter Corp. 1631
Weed killer and spreader.

E. F. Houghton & Co. 1914
Leather hydraulic and compression packings; cleaners for hydraulic and fuel-oil systems.

Johnson Bronze Co. 1505
Continuously cast* and universal bronze bar stock.

LaSalle Steel Co. 402
Cold-finished* and fatigue-proof steel bars.

Permatex Co., Inc. 1766
Sealants, pipe joint compound, gasket cement, penetrating oil, heavy-duty brake fluid hydraulic jack oil, automatic transmission fluid, valve grinding compounds (water-mixed and grease-mixed*), non-drying Prussian Blue for testing clearances, cold parts cleaner*.

Phillips Drill Co. 909
Concrete anchors, chucks, kits; concrete drill and anchor kit*.

Punch-Lok Co. 330
Hose clamps and fittings.

Rawlplug Co., Inc. 1524
Anchors, expansion shields and bolts, spring-action toggle bolts, drills and drill hammer.

Raybestos-Manhattan, Inc. 2119
Line of mechanical packings and gasket materials.

Rohm & Haas Co. 2024
Resin for reinforced plastics.

Star Expansion Industries Corp. 1026
Expansion shields (machine-bolt* and nail-type*), machine and wood screw anchors, hollow wall fasteners, carbide-tipped masonry drills.

U. S. Expansion Bolt Co. 1249
Anchors, fasteners, drills and allied products for masonry work; self-drilling shields*.

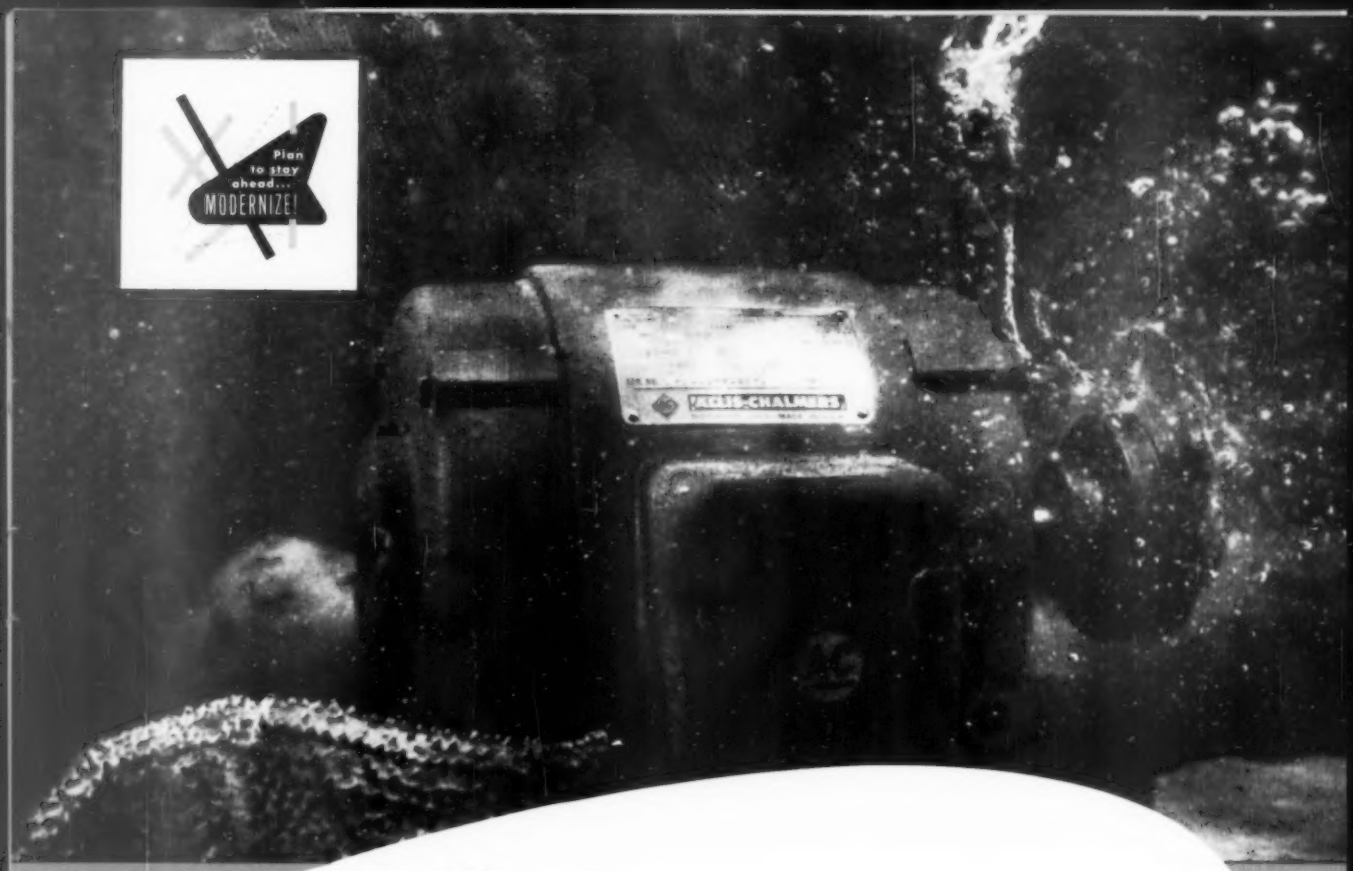
The Witt Cornice Co. 132
Cans, pails, lids, dollies.

* *Shown for first time*

Turn to page 159

For more facts Circle 530 on Reader Service Card

For more facts Circle 531 on Reader Service Card ➤



New motor development obsoletes today's application practices!

Only from Allis-Chalmers!

Super-Seal motors save up to 60%

Here's an amazing advance in motor technology! It's the *Super-Seal* motor line — an open motor design so completely unaffected by moisture, dust, dirt, oil, acids and alkalies that it can be used in many applications previously requiring more costly enclosed motors. *Savings range from 15 to 60%.*

Super-Seal motor superiority results from two distinct revolutionary insulating techniques. Available in any integral horsepower size, smaller *Super-Seal* motors incorporate a *Poxeal* stator. A durable epoxy resin encloses the stator, creating an electrical system impervious to outside elements.

In larger sizes, *Silco-Flex* insulation is used. In this system, silicone rubber is vulcanized into a homogeneous mass to form a flexible, moisture and heat resistant, void-free dielectric barrier around coils and leads.

Both of these insulation systems are unsurpassed. Proof? An encapsulated motor ran for hundreds of hours at full load in a 4% brine solution.

Find out more by reading the next pages; then contact your A-C representative or distributor, or write Allis-Chalmers at address shown on back page.

ALLIS-CHALMERS

518.9100

Two revolutionary insulating techniques developed and pioneered by Allis-Chalmers mean savings of millions of dollars for motor users . . .

New open motors are unaffected by moisture and contaminants

Modern insulating materials and new methods of application, now available in *Super-Seal* open-type motors, are drastically changing motor application standards. These insulations are so completely impervious to moisture and contaminants that *Super-Seal* open motors can be used in most applications formerly requiring costly enclosed designs. Existing applications have resulted in savings as high as 60% .

Basic insulation systems

Larger *Super-Seal* motors with form-wound stator coils use the *Silco-Flex* insulation system. Heart of this system is a remarkable rubber-like silicone elastomer, applied in semi-cured state and vulcanized to form a void-free, impervious dielectric barrier. More than four years of development and field testing have proven the superior electrical and physical properties of *Silco-Flex* insulation systems.

Stator coils of smaller random-wound motors are protected by equally effective *Poxeal* insulation system. A tough, durable case of epoxy resin completely seals the winding end turns and slot portions. Bonded to the stator laminations, it forms a seal completely impervious to contaminants.

Moisture resistance

In addition to being void-free, the silicone elastomer used in *Silco-Flex* insulation is moisture repellent. Even in high humidity, moisture does not form a surface film of condensation. Coils with this protection can operate completely immersed in water. In fact, one of the recommended cleaning procedures is use of detergent and water.

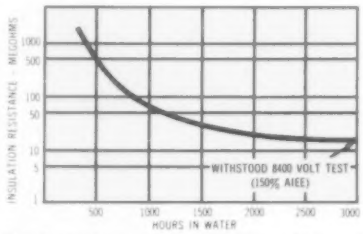


Fig. 1—Test curve shows insulation resistance of *Silco-Flex* insulation while immersed in water.

Moisture resistance of *Silco-Flex* coils is demonstrated in Fig. 1. After more than 3000 hours of total immersion with 2300 volts impressed on the coil, the test was terminated when it became apparent that little more drop could be expected in the coil's insulation resistance. At that point the coil still withstood a high potential test of 8400 volts without injury.

Encapsulated stator windings are equally well sealed. Motors with *Poxeal* insulation protection have been thoroughly tested under water while operating with full load and full voltage.

Resistance to contaminants

Silicone elastomers and epoxy resins are relatively inert to attack by practically all reactive agents. Further, the void-free construction of insulation systems used in *Super-Seal* motors prevents penetration of contaminants. As a result, *Super-Seal* motors are unaffected by oils, most acids, salt solutions, alkalies, and oils and are ideally suited for such applications.

Thermal stability

Temperature-wise, *Silco-Flex* insulation can easily withstand hot-spot temperatures of 200 C and more—

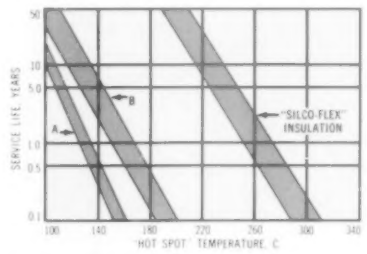


Fig. 2—Chart shows that *Silco-Flex* insulation more than meets Class H requirements.

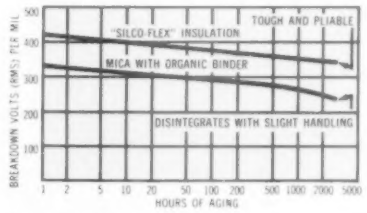
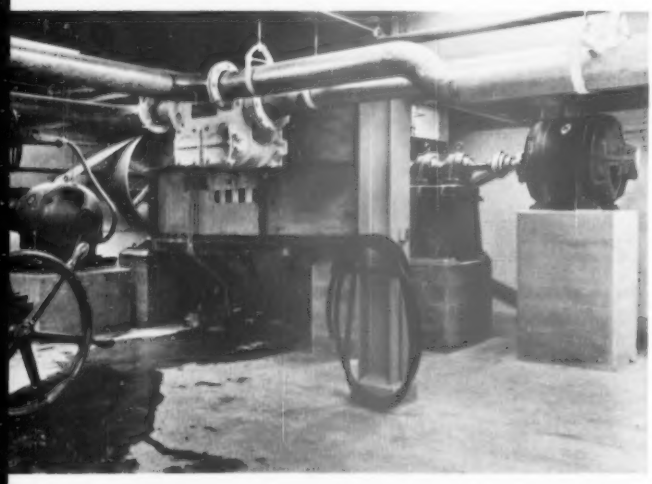


Fig. 3—Tests of 2300-volt insulated bars show thermal stability of *Silco-Flex* insulation.



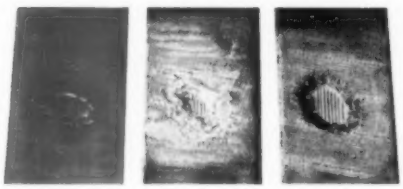
Paper mills have wide application for *Super-Seal* motors because of moist atmospheres.

easily meeting Class H temperature requirements (Fig. 2). At temperatures where the life of Class B coils would be measured in weeks, the life span of *Silco-Flex* coils is well beyond machine obsolescence.

Comparison with a mica-organic binder insulating system (Fig. 3) offers further proof of thermal stability. After 2000 hours of aging at 200 C with 8500 volts applied continuously, the *Silco-Flex* insulated coil was still tough, pliable, and completely serviceable. The mica-taped insulation had deteriorated to the point where it disintegrated readily and was completely useless.

An added advantage of *Silco-Flex* insulation is unusually high thermal conductivity — about twice that of conventional insulations. This means heat dissipates faster from its point of generation.

Poxeal insulation also demonstrates remarkably good thermal stability. Materials now in use are suitable for Class B temperatures, although actual classification of the insulation is determined by the basic material used.



Silco-Flex Insulation | Polyester Mica Tape | Asphaltum Mica Tape

Fig. 4—Samples of motor insulations after sandblasting give comparison of abrasion resistance.

Abrasion resistance

Resistance to abrasion is still another point of superiority in the insulation systems used for *Super-Seal* motors. Abrasion resistance of *Silco-Flex* insulation is compared to other types of insulation in Fig. 4. After one minute of sandblasting with 90-grit aluminum oxide and 100-psi air, only slight surface erosion appeared on the *Silco-Flex* sample. Other insulations were eroded to bare copper.

Application practices obsolete

The superior qualities of *Super-Seal* insulating systems, developed by Allis-Chalmers, make it necessary to reappraise present application practices. With virtually ageless insulation, *Super-Seal* motors assure more reliable service and require less upkeep than the best protected, conventionally insulated machines — and at considerably less cost.

Super-Seal, Poxeal, and Silco-Flex are Allis-Chalmers trademarks.

CHRYSLER KIMBERLY-CLARK GOODYEAR SOUTHERN CEMENT CONTINENTAL CAN SCOTT PAPER AMERICAN OIL CELOTEX HURON PORTLAND CEMENT FORD FIRESTONE PACIFIC GAS & ELECTRIC STANDARD OIL OF INDIANA B. F. GOODRICH DOW CHEMICAL MARLEY INGERSOLL-RAND LINK-BELT

WIDE ACCEPTANCE

of Super-Seal motors proves their advantages

Cement, petroleum, chemical, steel, mining, paper, utilities, municipalities and general industry — outstanding corporations in every field are specifying *Super-Seal* motors wherever operating conditions are tough.

Cost and *superior insulation* aren't the only reasons. Users are getting MORE MOTOR, too. Here's why:

Standard totally-enclosed motors, 55° C rise, have a *service factor of 1.* In other words, "nameplate" horsepower is the maximum. A 40° C rise *Super-Seal* motor with *Poxeal* insulation, and a 60° C rise *Super-Seal* motor with *Silco-Flex* insulation have a *service factor of 1.15.* For comparisons on what this difference means in required motor sizes, see this chart:

Rated Horsepower (Maximum Hp, TEFC)	Maximum Continuous Hp—Super-Seal Motor
15 hp	17.25 hp
25	28.75
40	46
75	86.25
125	143.75
200	230
350	402.5
500	575

Join the swing to *Super-Seal* motors. It will pay dividends fast. Contact your A-C representative or distributor, or write Allis-Chalmers at address shown on back page.

ALLIS-CHALMERS

SOUTHERN CALIFORNIA EDISON LONG ISLAND LIGHTING AVCO UNION BAG UNIVERSAL ATLAS UNION CARBIDE OHIO OIL INTERNATIONAL PAPER SOUTHERN PACIFIC PIPE LINE ALCOA ROHM & HAAS ARMOUR SHELL OIL COMMONWEALTH EDISON OWENS-ILLINOIS WYANDOTTE CHEMICAL BETHLEHEM STEEL ALLEGHENY-LUDLUM MEAD DU PONT DETROIT EDISON ESSO HERCULES POWDER SINCLAIR PIPE LINE GENERAL TIRE MONSANTO

This *SUPER-SEAL* MOTOR application SAVED $3000!

Find out how much you can save

This application of a *Super-Seal* open-type motor — in place of a weather-protected design of the same rating — *saved the user $3000.00!*

You can achieve similar savings! Fill out the data sheet below and *find out for yourself how much you can save — on a "no-strings-attached" basis.*

Here's what to do: 1) Select an enclosed motor application in your operations (a new motor need or, for comparison, a motor just purchased); 2) fill out the data sheet; 3) mail to the address shown.

We'll give you a cost quotation on a *Super-Seal* open motor for that application.

Fill out this data sheet—

no strings attached—to find out how much you can save on a new motor or on an existing motor installation

To: **ALLIS-CHALMERS**
888 S. 70th St., Milwaukee 1, Wis.

Motor Data

1. Type (i.e., squirrel cage):

Horizontal ☐ Vertical ☐

Hp ..... Rpm .....

2. Phase ..... Frequency .....

Voltage .....

3. (For synchronous only)

Power factor .....

Starting torque .....

Pull-in torque .....

Pull-out torque .....

Application Data

4. Description of application:

5. Drive: Direct-connected ☐

V-Belt ☐ Other: .....

Starting load .....

Ambient temperature .....

6. Operating conditions: .....

Dirty ☐ Clean ☐ Wet ☐ Dry ☐

Other .....

Information on Existing Motors
(for comparison)

7. Type of insulation .....

Type of enclosure .....

Time rating .....

Temperature rise .....

Bearings:

Anti-friction ☐ Sleeve ☐

8. Special characteristics or construction: .....

NAME .....

TITLE .....

COMPANY .....

ADDRESS .....

A-5869

ALLIS-CHALMERS

PRODUCTS EXHIBITED

Begins on page 146

PRODUCT **BOOTH**

MATERIALS HANDLING EQUIPMENT AND PARTS

Allis-Chalmers Mfg. Co. **1001**
Trucks: 2000-lb. fork lift*, pneumatic-tired lift*, LPG cushion-tired, pneumatic-tired.

American Chain & Cable Co., Inc. **2013**
Hoists and cranes, sling chains, wire-rope slings.

The Bassick Co. **125**
Light, medium, and heavy-duty casters.

Cushman Motor Works, Inc. **1230**
Flat-bed electric trucks*, electric personnel carrier.

Duff-Norton Co. **907**
Jacks and hoists.

The Fairbanks Co. **430**
Swivel and rigid casters; hand, two-wheel, and platform trucks; caster and truck wheels.

Faultless Caster Corp. **1128**
Casters and wheels, scaffold casters, grease-sealed casters.

Industrial East Co. **1038**
Rollers for heavy machinery or equipment; bar-stock carrier.

The Lug-All Co. **1409**
Lightweight winch hoist, combination tripod winch.

Philadelphia Hoist Div., Industrial Enterprises, Inc. **102**
Hoists: electric*, aluminum chain, ratchet lever, and aluminum trolley.

The Rapids-Standard Co., Inc. **1735**
Casters with gyro-action bearing*, demountable wheels*, steel-forged and cold-forged casters.

The Spencer Turbine Co. **113**
Pneumatic conveying system.

Thor Power Tool Co. **1552**
Air hoists.

Union Wire Rope Corp. **326**
Wire-rope slings, wire-rope and sling fittings.

Vanguard Engineering Co. **1525**
Three-directional mobile crane, counter-balanced mobile crane with boom*, battery-powered unit for converting hand-propelled equipment to power*, power-propelled platform trucks*.

B. E. Wallace Products Co. **1502**
Universal gantry*, tripod*.

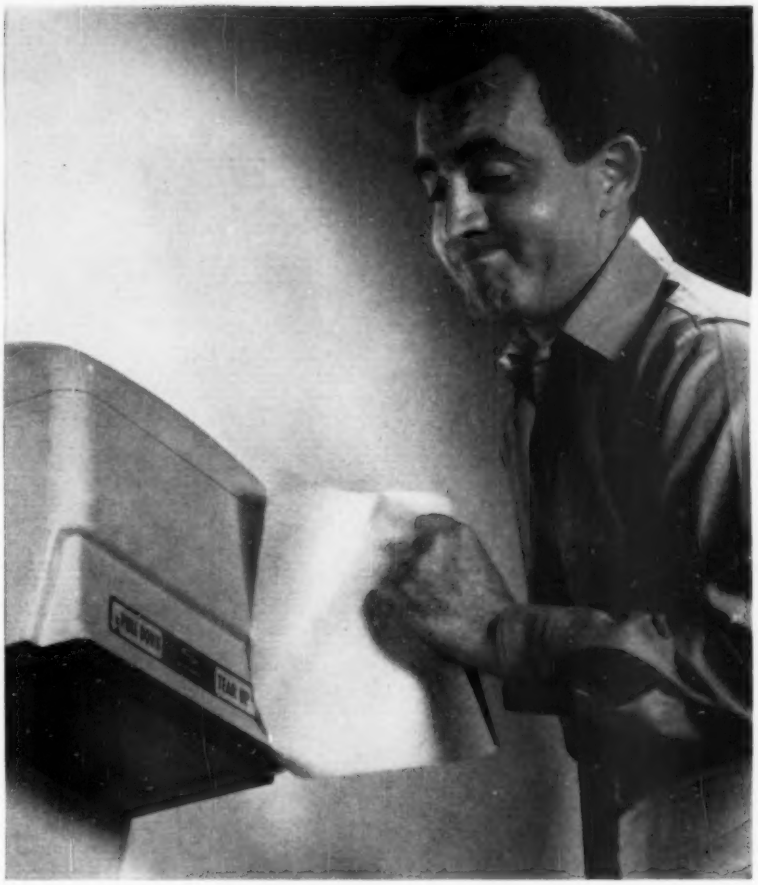
Yale & Towne Mfg. Co. **1002**
Narrow-aisle, straddle-lift electric truck*; platform lift truck modified for fire-fighting*; narrow-aisle electric lift truck with remote-controlled platform; bin and pallet lift trucks.

MECHANICAL POWER TRANSMISSION EQUIPMENT

Boston Gear Works **1913**
Gears, Reductors, and speed reducers; sprockets and chain; bearings; shaft mounted speed reducers*, pillow blocks and couplings.

* *Shown for first time*

Turn the page



Picture of worker saving money

He's helping cut waste 20% with Steiner roll towels

Paper towel expenses getting high? You can cut towel waste with a Steiner controlled roll paper towel dispenser. Here's how: User pulls from the cabinet only the amount of toweling he needs . . . no grabbing of a handful of towels that aren't needed, half used and then discarded. Still, user gets plenty of towels for thorough drying job. You can save 20% or more in towel costs with Steiner controlled dispensers.

Install them on a trial basis and see how you save. For more information contact your janitorial supplier or sanitary paper distributor or write Steiner Company, 740 Rush Street, Chicago 11, Illinois.

STEINER

STEINER COMPANY

740 RUSH STREET, CHICAGO 11, ILL., DEPT. B-1

Please send me free bulletins on Steiner controlled roll paper towel dispensers.

NAME_____

COMPANY_____

STREET_____

CITY_____ ZONE____ STATE_____

For more facts Circle 532 on Reader Service Card

Specify FURNAS

for QUALITY CONTROLS,
RUGGED PERFORMANCE
REDUCED MAINTENANCE

MAGNETIC STARTERS

Furnas Magnetic Starters, ruggedly designed to provide complete satisfaction, are available through Size 4, in a choice of 9 starters instead of the usual 5. They match the applications from 1 to 100 hp. All are UL listed, and all have dual voltage coils at no extra cost.

DRUM CONTROLLERS

Drum Controllers are available in over 1000 models. Their durability, ease of operation, versatility, and low cost make them adaptable to applications satisfied by manual control. Furnas Electric exclusively offers the Drum Control with built-in thermal overload.

PUSH BUTTONS

Push Buttons for every need—Standard, Heavy-duty, and Oil Tight. Attractive appearance and mounting flexibility assure acceptance. Furnas standardization and interchangeability mean more variations with fewer parts. Complete accessory line.

FOOT SWITCHES

MASTER SWITCHES

LIMIT SWITCHES

PRESSURE SWITCHES

Write today for free Catalog 5800, giving complete Motor Control information. 1032 McKee Street, Batavia, Illinois.

FURNAS

FURNAS ELECTRIC COMPANY

BATAVIA, ILLINOIS

SALES REPRESENTATIVES IN ALL PRINCIPAL CITIES

PRODUCTS EXHIBITED

Begins on page 146

PRODUCT — **BOOTH**

MECHANICAL POWER TRANSMISSION EQUIPMENT (Continued)

Cleveland Worm & Gear Co. 312
Speed reducers, worms and gears, variable speed drives.

Hoover Ball & Bearing Co. 1025
Bearings: extra lightweight*, maximum capacity*, flange*, and pillow-block*. Wide variety of other types of bearings; machine units.

Johnson Bronze Co. 1505
Oil-impregnated bronze and graphite-lined sleeve bearings; general-purpose bearings; motor sleeve bearings.

Manheim Mfg. & Belting Co. 1311
Adjustable V-belts, variable-speed belt*.

Ohio Gear Co. 1027
Stock and special gears and speed reducers, fin- and fan-cooled speed reducers*.

J. E. Rhoads & Sons 1357
Belting: all-synthetic, plastic/leather, leather.

Thomas Flexible Coupling Co. 1116
All-metal flexible couplings for power transmission.

PROTECTIVE COATINGS, PAINTING EQUIPMENT

The Arco Co. 219
Heavy protective coatings for metal, masonry, and concrete stacks.

Barreled Sunlight Paint Co. 415
Industrial maintenance paints.

The Joseph Dixon Crucible Co. 222
Graphite and silicone paint.

Fence Painter Corp. 1631
Painters for fences, tanks, pipe, walls, and curbs; floor stripers, wire brushes, stencils, and spray equipment.

The Glidden Co. 612
Polyester wall coating; epoxy floor and machinery finish; enamel for spraying, dipping, or baking; line of standard maintenance finishes.

Heil Process Equipment Corp. 1861
Plastic formulations for corrosion-resistant linings and coatings.

Jet-Dri Div., Consolidated Chemical & Paint Mfg. Co., Inc. 2116
Quick-drying enamel*.

Nordson Corp. 1045
Airless spray-coating equipment.

Pennsalt Chemicals Corp. 1352
Corrosion-resistant coatings; products for rebuilding concrete floors.

Permagile Corp. of America 1816
Plastic protective coating.

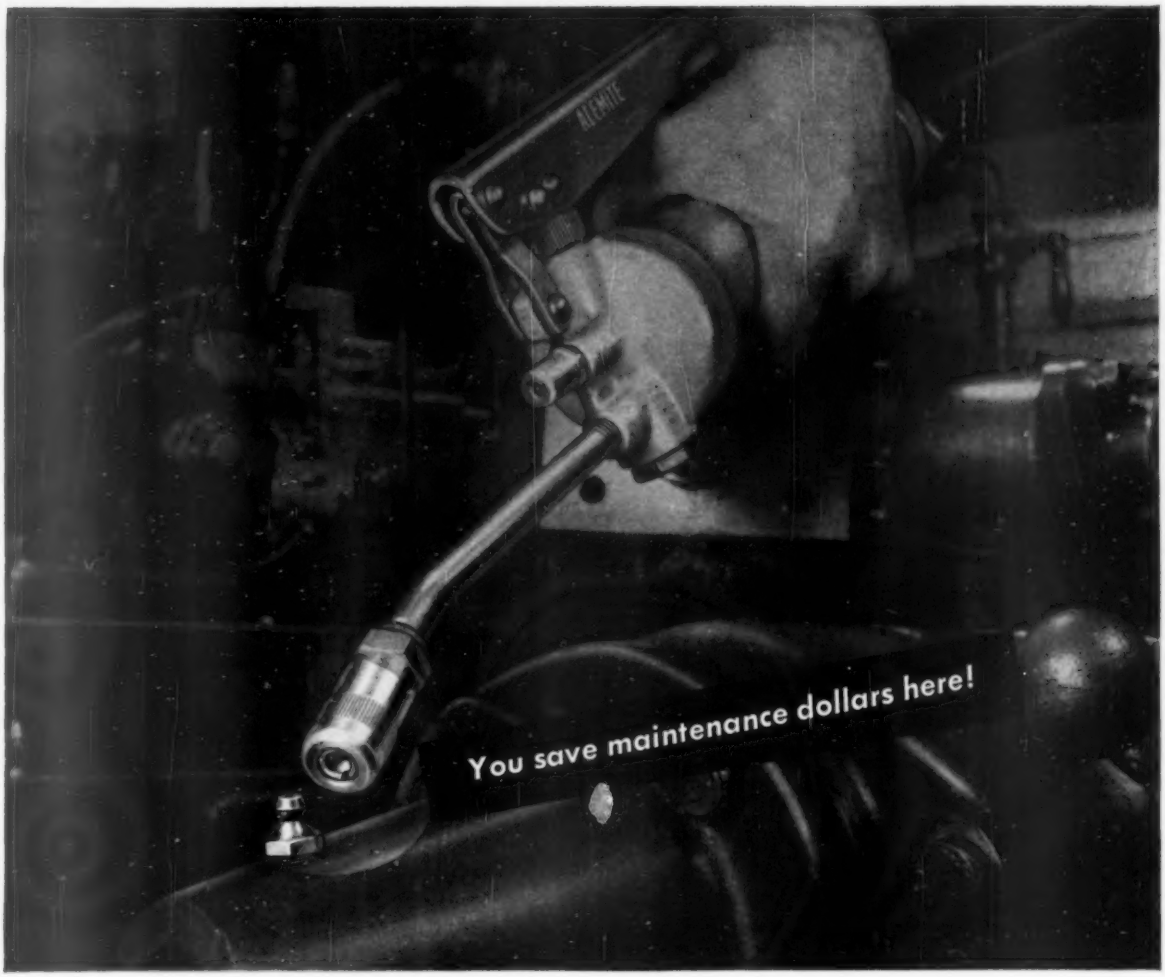
Pittsburgh Coke & Chemical Co. 1908
Protective coatings, pipeline enamels.

Quelcor, Inc. 1310
Aerosol vinyl spray*.

Rust-Oleum Corp. 1650
Rust-preventive coatings, coating for galvanized surfaces, chemical-resistant coatings.

* *Shown for first time*

Turn the page



Alemite Hand Guns and Fittings Give You Up to 10,000 lbs. of Lubrication Power!

The point of lubrication is where maintenance costs can be cut—providing you have the right equipment for the job!

This heavy-duty Alemite hand gun—combined with genuine Alemite lubrication fittings—brings up to 10,000 lbs. of pressure to even ordinary lubrication points. It gives you power to spare for fast, efficient, money-saving protection of every machine in your plant!

Gun handles all regular pressure gun greases. Long operating handle for maximum leverage. Loader fitting permits fast, clean filling (or gun may be filled by suction). Heavy steel linkage for true piston alignment. Capacity, 1 lb. Get more out of man-hours and machine-hours with Alemite lubrication equipment!

Symbol of SW Excellence

ALEMITE
DIVISION
STEWART-WARNER
CORPORATION

1850 Diversey Parkway, Chicago 14, Illinois

MAIL COUPON FOR COMPLETE INFORMATION

ALEMITE, Dept. E-19
1850 Diversey Parkway, Chicago 14, Illinois

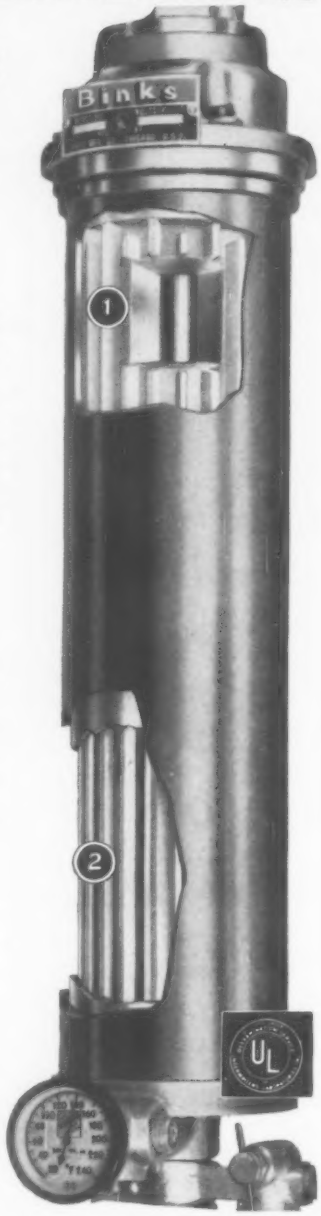
Please send me free your complete catalog of Alemite industrial lubrication equipment

Name .....

Company .....

City ..... State .....

Today all other PAINT HEATERS became obsolete



1 ALL NEW CENTER HEAT

— Saves you 50% to 75% on operating cost. A 1500 watt element in the new Binks paint heater does the work of 3000 and 6000 watt units found in other heaters. There are two reasons why. First, the heat is in the center. It has to heat paint. Second, the new paint tract has an enormous heat contact area. Low heat does the work of high heat . . . actually eliminates a primary cause of bake-out.

2 ALL NEW 27 FOOT LONG PAINT TRACT

— Multi-finned tract design packs over 3½ sq ft of uniformly heated surface into a 15″ height and 3½″ diameter. You attain highest viscosity control at delivery rates up to 30 oz per minute. Temperature is thermostatically controlled at 150°F. The entire paint tract removes for easy maintenance.

4 MODELS U/L APPROVED

Available for 115v or 220v operation, with or without paint circulating pumps.

SEND FOR FREE BULLETIN

Describes the exclusive technical features of this all-new Binks paint heater. Available from your nearest Binks industrial distributor or write direct to the address below.

Ask about our spray painting school
Open to all—NO TUITION—covers all phases

Binks EVERYTHING FOR SPRAY PAINTING

VISIT BOOTH 1102

Plant Maintenance & Engineering Show
Cleveland, Ohio, January 26-29

See Modular Electrostatic Spraying and memory-controlled automatics

Binks Manufacturing Company
3114-34 West Carroll Ave., Chicago 12, Ill.

9038

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

PRODUCTS EXHIBITED

Begins on page 146

PRODUCT — **BOOTH**

PROTECTIVE COATINGS, PAINTING EQUIPMENT (Continued)

Valdura Div., American Marietta Co. 219
Corrosion-resistant paints, heavy-duty maintenance paints.

The Wilbur & Williams Co. 403
Liquid rubber coat, instant-dry metal coat and enamel, zinc shield, skid-grip floor enamel, polyurethane* and liquid Saran*.

Wisconsin Laboratories, Inc. 429
Paintbrush conditioners; conditioners for spray guns and nozzles*.

RECORD AND TIMING SYSTEMS

Acme Visible Records, Inc. 101
Aluminum and plastic scheduling boards*, visible planning panels*, visible vertical filing system*, one-line listings for quick reproduction*, visible cabinets, inventory control system, rotary equipment.

Cushman & Denison Mfg. Co. 1654
Key control system.

Rotolite Sales Corp. 2106
White printer, portable dry developing unit.

Weber Marking Systems Div., Weber Addressing Machine Co. 1553
Machines for label printing and tag imprinting, handprinters, adhesive-tipped and continuous-form address stencils, plain and facsimile label size stencils, duplicating ink, paper stock.

SCAFFOLDS, LADDERS, AND PLATFORMS

Ballymore Co. 1537
Mobile access lift, hydraulic-lift work platform, safety stepladders.

Bil-Jax, Inc. 1130
Tubular steel scaffolding and parts.

Patent Scaffolding Co., Inc. 2129
Wood and light metal ladders, steel and aluminum scaffolds.

Putnam Rolling Ladder Co., Inc. 1722
Fiber glass stepladders*, fiber glass extension and single ladders, oak rolling ladders.

Safway Steel Products, Inc. 1730
Steel scaffolding, one-man hydraulic work tower, aluminum scaffolding*.

SHOP EQUIPMENT AND SUPPLIES

DeWalt Div., American Machine & Foundry Co. 1530
Power shop; woodworking and metal-cutting machinery.

The Dilley Mfg. Co. 1517
Magnetic grip-shields, permanent magnets*, magnetic nozzles for air-coolant and spray lines*.

* *Shown for first time*

Turn the page

Clean, sanitize, and Jenolize without fumes, flame, or excess water . . .

New All-Electric Hypressure Jenny!

Anywhere that flame, fumes, or excess water are objectionable or hazardous, the new Model E-350 All-Electric Jenny® will solve the cleaning or sanitizing problem. And with the new Jenolizing Process, machinery, equipment, and parts are left with a coating that protects against flash rusting, and gives a glossy, like-new appearance to painted surfaces.

Model E-350 combines the right amounts of heat, pressure, and cleaning solution to handle the majority of cleaning jobs at savings of up to 80% in time and labor costs. Its compact size, portability, low water output, and quiet operation without flame, smoke, or fuel fumes, make it ideal for use practically anywhere in the plant.

Send the coupon today for complete information. You'll welcome the outstanding performance of E-350—and the attractive plan which permits you to prove to yourself the economies of this new All-Electric Jenny.

Perfect for

manufacturing plants, food processors, textile mills, chemical and pharmaceutical plants, metal working and fabricating, petroleum industry, canneries, hotels and institutions, and every other operation where fumes, smoke, excess water are objectionable.

Mail Today!

Please send complete information on new E-350 All-Electric Jenny and Jenolizing.

Name ..... Title .....

Company .....

Address .....

City ..... Zone ..... State .....

hv

HOMESTEAD VALVE MANUFACTURING COMPANY
Hypressure Jenny Division, P. O. Box 86, Coraopolis, Pa.

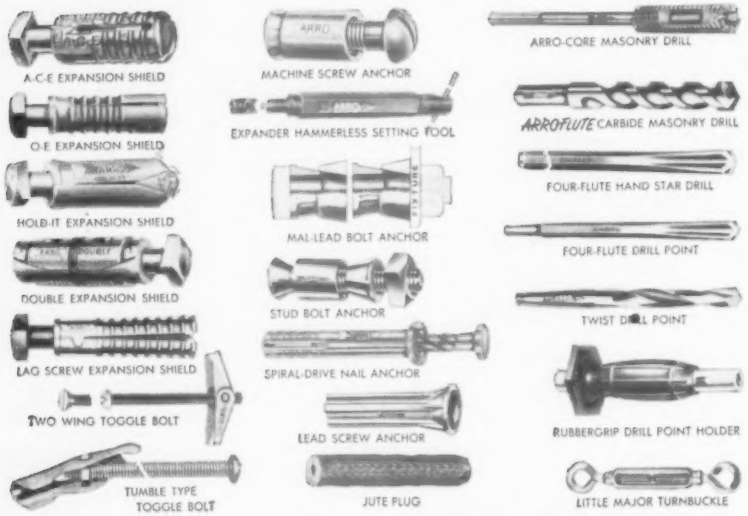
Your Nearest Distributor is

YOUR BEST STOCKROOM

for Quick Service *Always Specify* TRADE ARRO MARK

By offering you complete stocks of Arro fastening and drilling devices, your industrial, wholesale hardware, and electrical supply house enables you to keep production up while keeping inventory costs down.

THE TRADE ARRO MARK LINE OF MASONRY ANCHORING AND DRILLING DEVICES



See your industrial, hardware or electrical supplier TRADE ARRO MARK

ARRO EXPANSION BOLT COMPANY

DEPARTMENT E, P.O. BOX 388, MARION, OHIO

PRODUCTS EXHIBITED

Begins on page 146

PRODUCT	BOOTH

SHOP EQUIPMENT, SUPPLIES (Cont.)

Clifford B. Hannay & Son, Inc. 2120
Spring-retractable hose reels*, other hose reels.

International Research & Development Corp. 1226
Dynamic balancing machine.

Kimberly-Clark Corp. 504
Disposable wipers.

National Cylinder Gas Div., Chemetron Corp. 712
Arc-welding machines and accessories, welding electrodes, gas welding rods.

The Ridge Tool Co. 904
Pipe- and bolt-threading machines.

A. O. Smith Corp. 1620
Welding machines.

Stewart-Warner Corp. 1603
Dynamic balancing machines, 4 oz. to 300 lbs. and 1 lb. to 5000 lbs.; portable industrial balancer*.

Toledo Pipe Threading Machine Co. 1340
Pipe threading and cutting machines.

TOOLS—HAND

Arro Expansion Bolt Co. 1142
Drilling and fastening devices for masonry: anchors, toggle bolts, masonry drills, machine-bolt and expansion shields, turnbuckles.

Blackhawk Mfg. Co. 2016
Hydraulic pullers, jacks, hand pumps.

Clements Mfg. Co. 231
Blowtorch.

Diamond Expansion Bolt Co., Inc. 1640
Percussion masonry drills and holders; gun for anchors.

Durametallic Corp. 1751
Flexible-handle packing tools.

Greenlee Tool Co., Div. of Greenlee Bros. & Co. 1912
Hydraulic and ratchet pipe and conduit benders; ratchet and one-shot punch drivers; power bits, portable hydraulic foot pump and high-pressure portable power pump; nail puller.

Ideal Industries, Inc. 510
Electrician's tools.

The Imperial Brass Mfg. Co. 106
Flaring tool for 9 sizes of tubing*, tube cutters and benders.

Millers Falls Co. 1356
Precision and machinist's tools, hand tools, hacksaw blades, hole saws.

National Cylinder Gas Div., Chemetron Corp. 712
Oxy-acetylene welding and cutting apparatus.

Proto Tool Co., Div. of Pendleton Tool Industries, Inc. 232
Mechanic's hand tools.

J. A. Richards Co. 411
Pipe benders.

The Ridge Tool Co. 904
Hex wrenches*; pipe wrenches, threaders, and cutters; 3-wheel tubing cutter*,

* *Shown for first time*

Turn to page 168

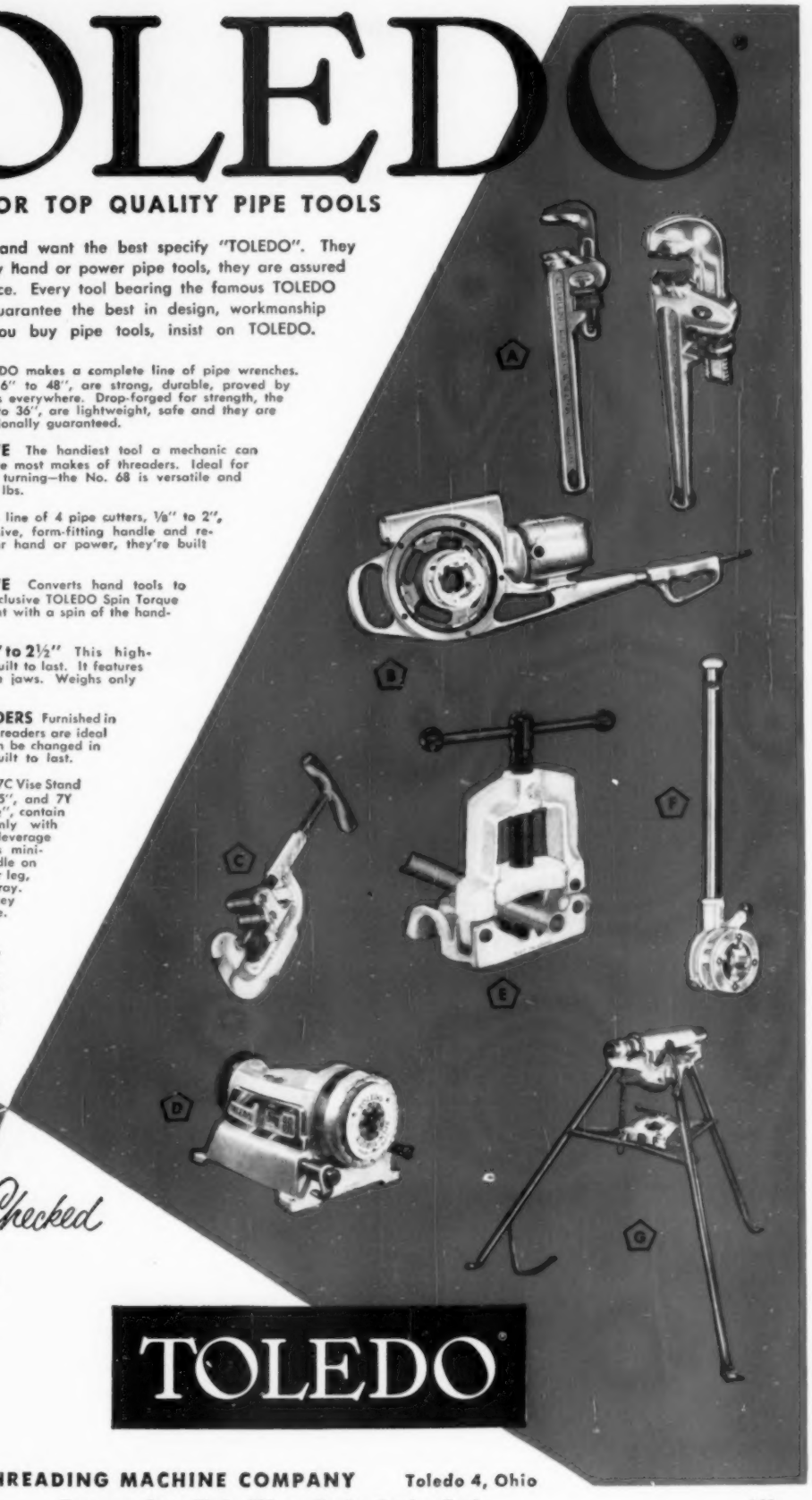
TOLEDO®

THE STANDARD FOR TOP QUALITY PIPE TOOLS

Maintenance men who know and want the best specify "TOLEDO". They know by using TOLEDO quality hand or power pipe tools, they are assured a lifetime of dependable service. Every tool bearing the famous TOLEDO label is quality checked to guarantee the best in design, workmanship and materials. Next time you buy pipe tools, insist on TOLEDO.

- **PIPE WRENCHES** TOLEDO makes a complete line of pipe wrenches. The malleable wrenches, 6" to 48", are strong, durable, proved by years of use by mechanics everywhere. Drop-forged for strength, the aluminum wrenches, 10" to 36", are lightweight, safe and they are strong. Both are unconditionally guaranteed.
- **No. 68 POWER DRIVE** The handiest tool a mechanic can own, adaptable to operate most makes of threaders. Ideal for pulling, lifting, cranking, turning—the No. 68 is versatile and powerful—weighs only 33 lbs.
- **PIPE CUTTERS** A new line of 4 pipe cutters, 1/8" to 2", features TOLEDO'S exclusive, form-fitting handle and replaceable slide plate. For hand or power, they're built for rugged service.
- **No. 88 POWER DRIVE** Converts hand tools to power. Equipped with exclusive TOLEDO Spin Torque Chuck that holds pipe tight with a spin of the handwheel. 1/8" to 2" pipe.
- **No. 22 PIPE VISE, 1/8" to 2 1/2"** This high-quality, low-cost vise is built to last. It features Acme threads, replaceable jaws. Weighs only 12 lbs.
- **DROP HEAD THREADERS** Furnished in 3 sizes, 1/8" to 2", these threaders are ideal for close corners. Dies can be changed in seconds. They're light—built to last.
- **VISE STANDS** The new 7C Vise Stand with chain vise, 1/8" to 5", and 7Y with yoke vise, 1/8" to 2 1/2", contain many features found only with TOLEDO . . . compound leverage applied to chain requires minimum turns on screw, handle on top, pipe benders over rear leg, rugged steel folding tray. Easy to carry—set up—they won't collapse when in use.

TOLEDO makes many other hand and power pipe tools. For more information, write for the free catalog showing the complete TOLEDO line of pipe tools.



Quality Checked

See TOLEDO's complete tool display—Booth No. 1340 Plant Maintenance Show Cleveland, Ohio January 26 to 29, 1959

TOLEDO®

THE TOLEDO PIPE THREADING MACHINE COMPANY Toledo 4, Ohio

ANOTHER IN A SERIES
OF MOTOR FACTS
FROM ALL INDUSTRIES

"Roughest duty we have ever seen motors endure"

reports Marquette Iron Mining Co. of the Westinghouse Life-Line A motors in its Eagle Mills Pelletizing Plant

Operating continuously, 24 hours per day, dependable Westinghouse Life-Line® "A" motors drive a network of fans and conveyors at the Eagle Mills Pelletizing Plant of Marquette Iron Mining Co., Ishpeming, Michigan.

Some of these motors are located directly above a sintering machine where ambient temperatures often exceed 200° F and the motor is subjected to deposits of finely divided iron ore. Under these conditions, not a single motor breakdown or failure has occurred during 11 months of service.

Says Mr. Ed Gagnon, plant electrician, "Our Westinghouse motors have given us complete reliability on the roughest tests we have ever seen a motor endure."

For specific information about the ways your operation can benefit from the improved performance, longer life and reduced maintenance offered by the dependable Life-Line "A," contact your nearby Westinghouse sales engineer. Or write to Westinghouse Electric Corporation, P.O. Box 868, 3 Gateway Center, Pittsburgh 30, Pennsylvania. J-22077

YOU CAN BE SURE...IF IT'S Westinghouse

Deposits of powdered iron ore are no problem to this 2-hp Life-Line "A" motor driving conveyor which carries powdered iron ore to the balling disc where ½" pellets are formed. Presealed, prelubricated Life-Line "A" bearings keep dirt and other material out.

NOW... private voice paging with this transistorized Radio Pager

NOW . . . MESSAGES CAN BE RADIOED DIRECTLY AND PRIVATELY TO YOUR KEY PERSONNEL

A problem comes up. A certain man is urgently needed . . . *now!* He's "somewhere in the building" . . . but no one knows exactly where. With Motorola Radio Paging, you can contact him in seconds. Here's how. The switchboard operator sounds a tone in his Radio Pager . . . (and in his only). He is alerted instantly, just as if she reached out and tapped him on the shoulder. He presses the button on his Pager and hears the full voice message. Total time elapsed . . . just seconds, and he's on his way to where he's needed.

Gone are the confusion and irritation of bells or public address calls that get drowned out—or telephone "chasing down". Executives, engineers, supervisors, maintenance men—all get their messages on Radio Pagers that slip in the pocket or clip to the belt . . . cutting costs by increasing everyday efficiency and meeting emergencies faster. Write Motorola today.

Immediate, positive voice contact—regardless of location.

HANDIE-TALKIE
MOTOROLA Radio Pager

Motorola Communications & Electronics, Inc., 4501 Augusta Blvd., Chicago 51, Ill., A Subsidiary of Motorola Inc.

PRODUCTS EXHIBITED

Begins on page 146

PRODUCT — **BOOTH**

TOOLS—HAND (Cont.)

jam-proof gear threader*, pipe extractors and vises; top screw chain vises*.

Templeton, Kenly & Co. 205
Mechanical and hydraulic pullers, jacks.

Toledo Pipe Threading Machine Co. 1340
Pipe cutters*, vise stands*, aluminum pipe wrenches*; pipe threaders (hand), vises and reamers.

The Tool & Mfg. Co., Inc. 124
Hand chisels*, center punches*, backing-out punches*, cold cutters*.

Velocity Power Tool Co. 1919
Automatic-lighting air acetylene torch.

Western Industries, Inc. 1551
Hydraulic and mechanical jacks; diesel nozzle tester.

TOOLS—PORTABLE POWER

The Airetool Mfg. Co. 1504
Tube expanders, tube cleaners, pneumatic tools.

American Pullmax Co., Inc. 1516
New model universal shearing and forming machine* and others.

Beaver Pipe Tools, Inc. 1150
Pipe machine*, automatic chuck on portable pipe machines*, abrasive cut-off machine, pipe and bolt machine, power pipe cutters and threaders.

The Black & Decker Mfg. Co. 1233
Belt sander*, nibbler, shears, hammer, saws, and drills.

Blackhawk Mfg. Co. 2016
Hydraulic pullers and hand jacks; hydraulic pumps, electric and hand; hydraulic rams, cylinders, transmission, and control components.

Collins Machinery Corp. 910
Mobile pipe shop; pipe threader and cutter.

The Martindale Electric Co. 107
Commutator grinders, turning tools, undercutters, saw, and cutters; high-speed steel and carbide rotary burs and steel rotary files; metal-slitting saws, electrical and mechanical etchers.

Millers Falls Co. 1356
Electric drills, sanders, screwdrivers*, circular saws*, bench grinders*, impact wrench*, band-saw blades, high-speed bands*.

Milwaukee Electric Tool Corp. 1624
Portable electric tools and power hacksaws; electric hammer*.

The Oster Mfg. Co. 914
Pipe and bolt-threading machines.

Phillips Drill Co. 909
Electric impact hammer.

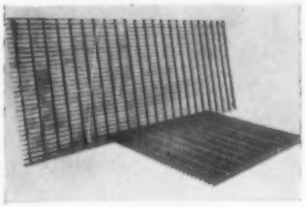
Punch-Lok Co. 330
Hose clamping machine*.

Ramset Fastening System 2103
Fastening tools: multi-purpose hammer-in* and power-actuated.

Remington Arms Co., Inc. 1423
Mechanic's maintenance kits, stud driver kits, stud driver, studs, power

* *Shown for first time*

Fractured round illustrates the fibrous structure of 4-D Wrought Iron. These iron silicate fibers provide built-in resistance to corrosion and fatigue stresses. This unique characteristic is duplicated in no other metal.



GRATINGS

LADDER STEPS

BLOCK RACKS

STACK SUPPORTS

PITTSBURGH—"A full line of 4-D Wrought Iron bars, rounds and angles is now available from A. M. Byers Company. Bars are available in lengths up to 30 feet. Orders will be shipped within 2 to 7 days after receipt in Pittsburgh."—*A. S. Chalfant, Vice President.*

To meet the expanding market applications of our specifiers, Byers is now geared for quick service on 4-D Wrought Iron bars and shapes.

Our company has *always* manufactured Wrought Iron bars and shapes in limited sizes. But increased demand for 4-D Wrought Iron in commercial, industrial, and residential specifications has prompted us to supplement our line even more fully.

4-D Wrought Iron's resistance to corrosion and fatigue stresses keeps maintenance at rock bottom. No costly repairs. No premature failures. Thus, users of this versatile material can look forward to long life installations at the lowest cost per year of service.

Availability of a full line of 4-D Wrought Iron bars, rounds and angles—with dependable, rapid-fire delivery—now enables specifiers to install complete jobs with this time-proven metal. Now, you need no longer use ferrous substitutes in such applications as: gratings, ladle stopper rods, mechanical shielding for nuclear reactors, manhole ladder steps, curing and process racks and bolts and brackets.

Ask the Byers representative for specific information. Or, write us for a prompt reply. A. M. Byers Company, Clark Building, Pittsburgh 22, Pa.

BYERS 4-D WROUGHT IRON

TUBULAR AND FLAT ROLLED PRODUCTS

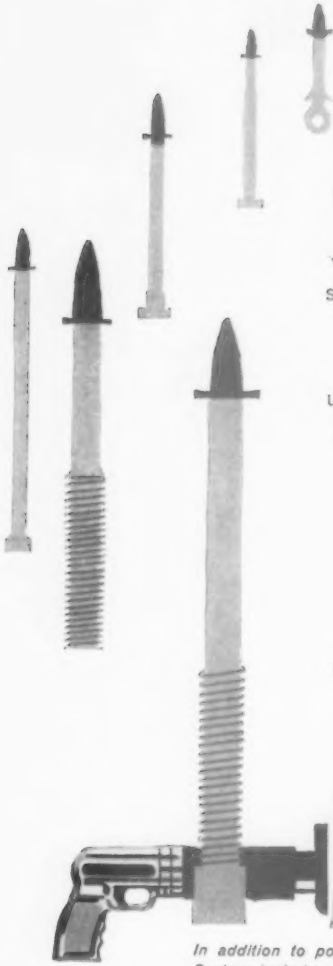
ALSO AMBALLOY ELECTRIC FURNACE STEEL PRODUCTS AND PVC PIPE AND SHEET

Corrosion costs you more than Wrought Iron

For more facts Circle 541 on Reader Service Card

ONLY RAMSET

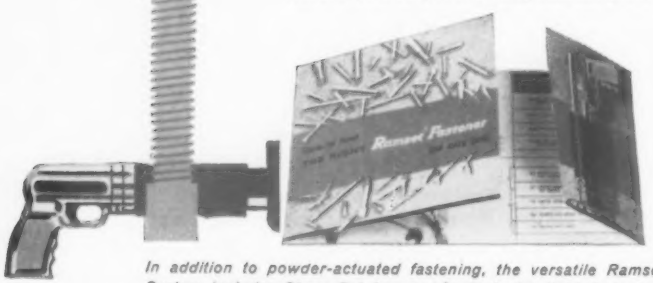
offers over 100 different powder-driven fasteners for specific jobs



Ramset, and only Ramset, offers a complete line of "job-fitted" fasteners . . . guarantees the most economical fastener for every application. Versatile Ramset is the best-known and most widely-used powder-actuated fastening system in the entire maintenance field.

In fastening to steel, concrete or masonry, Ramset tools are easiest to use . . . Ramset austempered fasteners are the best you can buy, and perform where others fail. Find out about the astounding savings . . . the absolute superiority of the Ramset Fastening System. Find your dealer's name under "Tools" in the Yellow Pages or write us direct.

Write for your copy of this handy fastener guide



In addition to powder-actuated fastening, the versatile Ramset System includes Shure-Set hammer-in tools for light fastening, and Ringblaster heavy-duty kiln gun.

Ramset Fastening System

WINCHESTER-WESTERN DIVISION · OLIN-MATHIESON CHEMICAL CORPORATION
BEREA ROAD · CLEVELAND, OHIO

PRODUCTS EXHIBITED

Begins on page 146

PRODUCT — **BOOTH**

TOOLS—PORTABLE POWER (Cont.)

loads, captive studs, drills, saws, sanders, grinders, screwdrivers.

J. A. Richards Co. 411
Die saws for making steel rule dies.

The Ridge Tool Co. 904
Power drives for pipe cutting and threading.

Skil Corp. 2115
Saws, drills, sanders, shears, drivers, grinders, abrasives; portable power tools; reciprocating saw*.

Templeton, Kenly & Co. 205
Mechanical and hydraulic jacks and pullers; remote-controlled single- and 2-way rams with hand, electric, gasoline, and air pumps; hydraulic double- and triple-grip pullers and push-pullers.

Thor Power Tool Co. 1552
Electric shear*; dustless air hammer; impact wrenches; air and electric grinders, circular saws, and drills; electric hammer.

Toledo Pipe Threading Machine Co. 1340
Power drives for pipe cutters and threaders.

The Tool & Mfg. Co., Inc. 124
Pneumatic chipping and scaling chisels.

Velocity Power Tool Co. 1919
Portable pipe threader, stud driver, stud hammer.

Wells Mfg. Corp. 1029
Vertical bandsaw, horizontal metal-cutting bandsaw machines.

T. D. Williamson, Inc. 1042
Pipeline tapping and plugging machines.

UTILITY AND AUXILIARY EQUIPMENT

Clements Mfg. Co. 231
Furnace booster blowers.

Commercial Filters Corp. 1215
Filters for compressed air, hydraulic fluids, plating and chemical processes; cartridge oil filters; vacuum and disposable-media filters; coolant clarifiers; magnetic separators.

Davey Compressor Co. 1538
Rotary air compressors.

Dean Thermo-Panel Coil Div., Dean Products, Inc. 2014
Panel-type heat exchanger units, valve warmers.

Eriez Mfg. Co. 306
Magnetic-separation, automation and vibratory equipment; permanent plate magnets*, bin vibrators*, 50-ton vibratory feeder*.

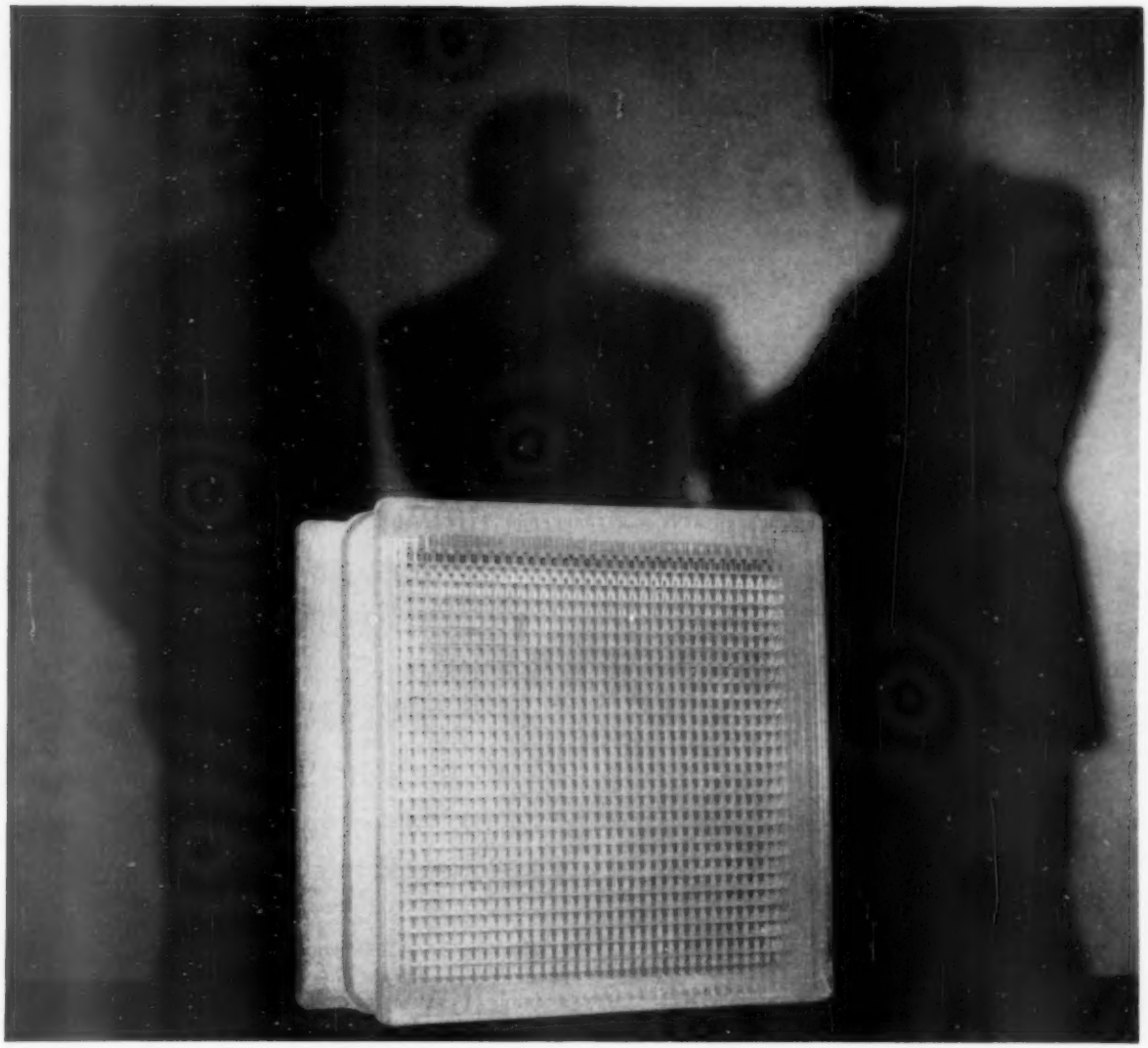
Fuller Co. 513
Rotary compressor, vertical gas pump.

Heil Process Equipment Corp. 1861
Rubber and vinyl-lined process, pickling, and plating equipment; graphite heat-transfer units.

The Johnson Corp. 1626
Instant steam hot-water heater; compressed air aftercoolers and separators.

* *Shown for first time*

Turn the page



PC Glass Blocks help solve daylighting problems for plant men in charge of . . .

Building design and maintenance—PC Glass Blocks give you daylight control, high insulation value, noise control, and impact strength. Benefit? Design flexibility in solving your daylighting problems in window areas and curtain walls. And maintenance? Rock-bottom because there's nothing to rust, rot, or paint . . . breakage is rare . . . once-or-twice a year washing is usually adequate.

Production—PC Glass Blocks control daylight in work areas. Result—eyestrain and heavy shadows are eliminated . . . job accuracy and efficiency increase.

Employe relations—PC Glass Blocks help create cheerful, relaxed, draft-free work and recreational areas. This better plant environment improves worker morale.

New construction or plant modernization? You'll find it profitable, in more ways than one, to investigate PC Glass Blocks. Write for complete product details to Pittsburgh Corning Corporation, Dept. N-19, One Gateway Center, Pittsburgh 22, Pennsylvania. In Canada: 57 Bloor Street West, Toronto, Ontario. Also manufacturers of FOAMGLAS® insulation.

Visit our Booth No. 2123 at the Plant Maintenance Show, Cleveland

PITTSBURGH PC CORNING

No more broken windows...

Rockwell has glazed with Structoglas

Structoglas is *shatterproof reinforced plastic*—made from a specially developed durable resin to withstand shock, impact, vibration—eliminate glass breakage. Structoglas is *tinted* to filter and diffuse sunlight. Tiring glare is gone—without special painting. And Structoglas is *easily installed* with ordinary glazing methods.

What about your plant? You can let in plenty of free natural daylight and end broken windows, too. Glaze *once and for all* with Structoglas.

structoglas®

reinforced plastic panels

WRITE TODAY for new Structoglas Glazing Folder, Firestone and Rockwell Case Histories. Structoglas Division of International Molded Plastics, Inc., Dept. F-1 Cleveland 9, Ohio.

PRODUCTS EXHIBITED

Begins on page 146

PRODUCT — **BOOTH**

UTILITY AND AUXILIARY EQUIPMENT (Cont.)

Kenco Pump Div., American Crucible Products Co. 508
Non-clog pumps*, alternator*.

Martin Engineering Co. 227
Air and electric vibration inducers; trackside freight-car shaker*.

Platecoil Div., Tranter Mfg. 2130
Heat exchangers in various sizes and types of metal; cut-away tanks.

PurOlator Products, Inc. 120
Filters for oil, air, and process fluids.

Quincy Compressor Co. 1237
Air compressors.

Ruud Mfg. Co. 1033
Water heaters and multi-coil heaters.

A. O. Smith Corp. 1620
Water heaters.

Vanton Pump & Equipment Corp. 1515
Chemical, plastic, self-priming pumps; centrifugal, plastic pumps*.

Winnen Incinerator Co. 1860
Incinerators, auxiliary fuel-burning devices, insulated chimney, breeching.

VALVES, PIPING, FITTINGS

Aeroquip Corp. 1134
Flexible hose with re-usable fittings for hydraulic, air, and other fluid-line applications; self-sealing quick-connect couplings.

Armco Drainage & Metal Products 319
Industrial piping.

Armstrong Machine Works 1630
Steam, air, and air-relief traps; domestic* and commercial dehumidifiers; pipeline strainers; zone valves for hot-water heating*.

A. M. Byers Co. 1720
Wrought-iron pipe and plates; PVC pipe.

Chiksan Co., subsidiary of Food Machinery & Chemical Corp. 704
Steel swivel joints* for steam, chemicals, and general service, with interchangeable packing units.

Cobra Metal Hose 423
Wet-heat radiator connectors; bronze, steel, and stainless steel pump connectors* with iron pipe nipples or flanges.

Crawford Fitting Co. 1719
Tube fittings, quick-connect fittings, glass seal, plastic, and metal fittings.

DeZurik Corp. 1241
Valves: plug, three-way, four-way, fabricated-gate.

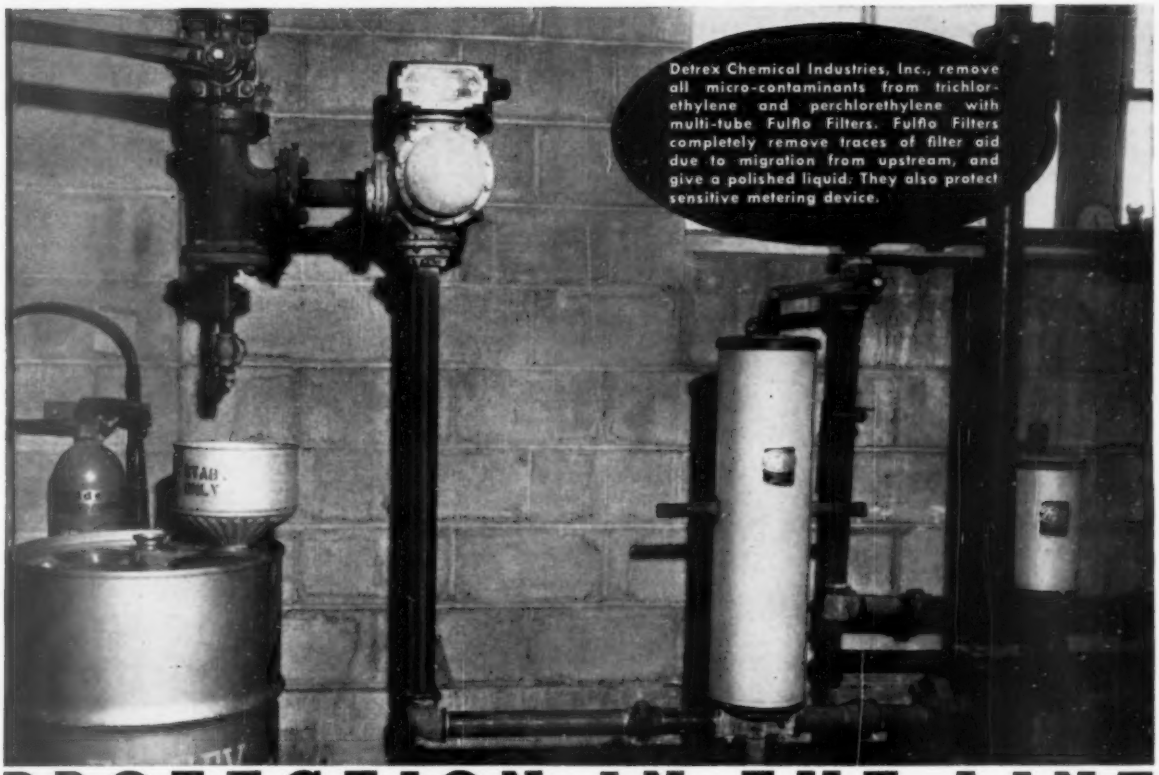
The Fairbanks Co. 430
Malleable iron unions; bronze and iron-body valves.

Fanjet Roof Cooling Div., Mullermist Irrigation Co. 1747
Roof cooling system.

Fibercast Co. 1856
Glass-reinforced, epoxy-resin pipe, tubing, and fittings.

Flexonics Corp. 1331
Metal and synthetic rubber flexible

* *Shown for first time*



Detrex Chemical Industries, Inc., remove all micro-contaminants from trichlorethylene and perchlorethylene with multi-tube Fulflo Filters. Fulflo Filters completely remove traces of filter aid due to migration from upstream, and give a polished liquid. They also protect sensitive metering device.

PROTECTION IN THE LINE

Detrex assures product quality — protects instruments with Fulflo Filters

To maintain rigid quality standards, Detrex installs Fulflo Filters in line at final packaging in drums of trichlorethylene and perchlorethylene. Fulflo Filters assure micro-clarity of the final product by removing all impurities. Fulflo Filters also protect the sensitive instrument used to meter the final product. This means definite savings in maintenance costs.

These Fulflo Filters have been in use at Detrex for over five years, with excellent results in product clarity, equipment protection, and reduced maintenance costs.

Fulflo Filters, with genuine Honeycomb Filter Tubes, provide continuous micro-clarity for all types of industrial fluids — chemicals, oils, liquid fuels, compressed air, water and many others. Models are available for high or low flow rate, pressure, *p*H, viscosity, and temperature.

Write for technical literature or engineering assistance to Department. FA.

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

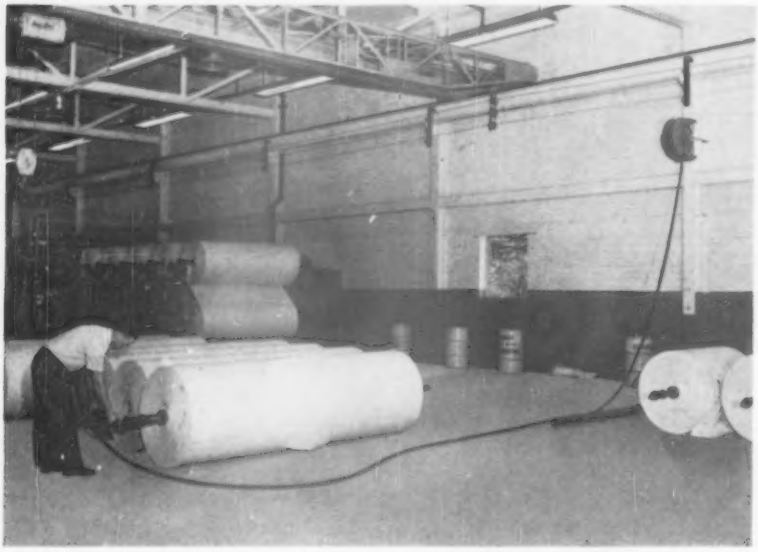
MICRO-CLARITY AT MINIMUM COST

Fulflo FILTERS — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

CFC FILTERS — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*

VISIT US AT BOOTHS 1215-1219 AT THE MAINTENANCE SHOW

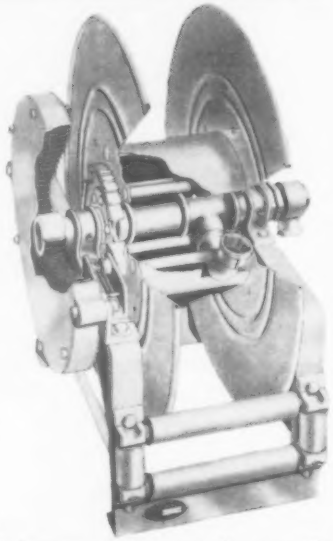
Maintenance and Engineering Personnel Impressed by New Hannay Spring Return Reel



A completely new concept of spring return reels for industry will be introduced at the 1959 National Plant Maintenance & Engineering Show by Clifford B. Hannay & Son, Inc., Westerlo, N. Y. With internal piping up to 1½ inches I.D., and springs tested for over 500,000 cycles, these new reels meet industry's requirements for a spring return reel for heavy duty service.

Maintenance and engineering personnel who have seen the new Hannay reels in actual installations and field tests are impressed by their performance. Full-flo hub assemblies provide unrestricted flow of liquid or gas. Smoother flow reduces line loss, maintaining constant operating pressure.

Typical of the many industrial applications for the new Hannay reel is the installation, shown above, at Finch Pruyn & Co., Inc., Glens Falls, N. Y. The reel is wall mounted and handles 75 ft. of ¾ in. I.D. hose for operating heavy duty air wrenches. In this use, the Hannay reel reduces hose damage from heavy paper rolls, permits operation in any part of a large work area and speeds installation and removal of expanding hub arbors.



Cutaway of the new Hannay Reel shows "free-spin" hub clutch, Full-flo hub assembly and removable spring case.

Several models of the new reel will be on display at the Hannay Booth, and complete literature on the Hannay line of Industrial Reels will be available.

BE SURE TO SEE BOOTH 2120

C. B. Hannay & Son, Inc., Westerlo, N. Y.

Hose Reels by HANNAY

PRODUCTS EXHIBITED

Begins on page 146

PRODUCT — **BOOTH**

VALVES, PIPING, ETC. (Cont.)

hose; expansion joints and compensators; fittings, tube, hose; flexible connectors.

Flodar Corp. 1344
Hydraulic fittings (self-flaring, no-flare, flare types), porthole fittings.

Grinnell Co., Inc. 2004
Fittings: pipe, welding, and PVC; pipe hangers, unions; diaphragm valves; automatic sprinklers.

Homestead Valve Mfg. Co. 2125
Lubricated and non-lubricated plug valves.

The Imperial Brass Mfg. Co. 106
Steel, stainless steel, and brass* fittings; high-temperature, high-pressure needle valves*; refrigeration hose*; polyethylene tubing; flex, compression, brass-pipe, and flared-tool fittings; hose and fittings; valves; air nozzles.

Jamesbury Corp. 1907
Ball valves and remote-control devices.

The Johnson Corp. 1626
Rotary pressure joints, solenoid operated valves.

The Korfund Co., Inc. 711
Flexible connectors*.

The Lunkenheimer Co. 2012
Bronze, iron, and steel valves; cocks; boiler mountings; air devices.

Minneapolis-Honeywell Regulator Co. 2030
Pneumatic machine control valve.

The Ohio Injector Co. 1731
Bronze, iron, forged-steel, and cast-steel valves; motor-driven cast-steel gate valve.

Titeflex, Inc. 2006
Flexible metal and Teflon hose lines; couplings; Teflon hose lines in large sizes*.

Vanton Pump & Equipment Corp. 1515
Plastic gate valves.

Walworth Co. 1439
Bronze, steel, iron, and PVC valves and pipe fittings; lubricated plug valves.

The Weatherhead Co. 1923
Flared and flareless brass and steel tube fittings; bulk hose; hose assemblies and reusable hose ends.

T. D. Williamson, Inc. 1042
Pipe plugs, "Z" bushings for wall-sleeve applications, pipeline pigs.

Yarnall-Waring Co. 2113
Steam traps, strainers, blow-off valves, expansion joints.

VIBRATION MOUNTS

Barry Controls, Inc. 512
Leveling machinery mounts; vibration isolators.

Clark, Cutler & McDermott Co. 1903
Vibration-damping machine pads, adjustable vibration-damping machine mounts.

The Felters Co. 405
Felt isolation machinery levelers* and mounts; felt products, felt.

* *Shown for first time*

Turn the page

HERE'S HOW TO MAKE MORE MONEY!

Stock THE COMPLETE LINE of Eagle cans and oilers and you'll cash in on extra sales...fast!

One Eagle sale leads to another! Each oiler, safety can, oil or gasoline can you sell brings your customers back . . . satisfied . . . for more!

Display the ONE COMPLETE LINE . . . an Eagle oiler or can for every purpose.

Order *the Complete Line* NOW from your supplier. Or write to us for information.

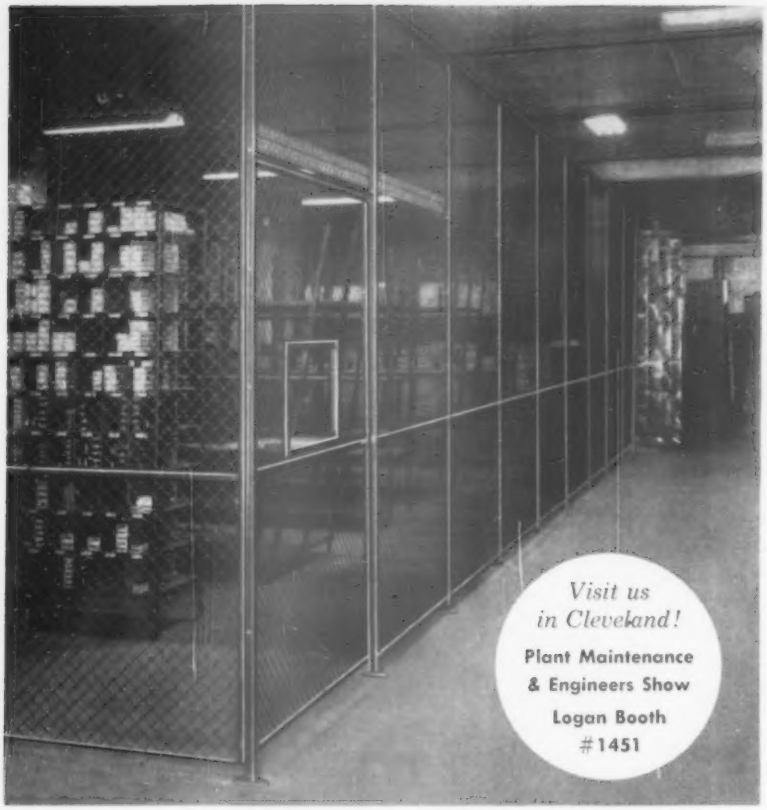
Eagle products are stocked by leading suppliers in the U.S. and Canada.

Ask for the Complete Eagle Catalog **IT'S FREE!**

EAGLE

Serving the Trade Since 1894

MANUFACTURING CO., Wellsburg, West Virginia



Stock Size Wire Partitions

LOW COST—EASY TO ERECT—stock size panels are 5′ wide and made in 7′, 8′, 9′, and 10′ heights—heights most practical for strength, rigidity, and ease of erection. Hinged or sliding doors, service windows, and hinged wickets are available in conventional size.

Logan Wire Partitions are fabricated in standard No. 10 gauge wire, 1½″ square diamond mesh. Standard framing is 1″ x ½″ x ⅛″ steel channel with 2—1″ x ⅜″ x ⅛″ channel stiffening bars. Capping bars are 1½″ x ½″ x ⅛″ steel channels bolted to top of panels. Wire Partitions come in one shop coat gray — other colors at additional charge.

Simple instructions make Logan standard panels easy to erect—no special skill required. Complete instructions and diagram accompany every job.

LOGAN SPIRAL AND STEEL STAIRS Logan builds all types of steel and spiral stairs for industrial plants. Made special to measurements you furnish.

LOGAN PIPE RAILINGS Pipe railings are made to your specifications, any pipe diameter needed.

Send your specs or sketches on your next job. Builders and plant officials all over the nation look to Logan as a quality source for custom made iron work. Get Logan's low price fast delivery.

LOGAN CO.

BUILDERS IRON DIVISION • 515 Cabel St. • Louisville 6, Kentucky

PRODUCTS EXHIBITED

Begins on page 146

PRODUCT **BOOTH**

VIBRATION MOUNTS (Cont.)

The Korfund Co., Inc. 711
Steel spring isolators, isolation mounts, hangers.

MB Manufacturing Co. 414
Vibration isolator pad, leveling mount.

WASHROOM FACILITIES, DRINKING FOUNTAINS

American Dryer Corp. 1851
Hand dryers.

Bradley Washfountain Co. 425
Stainless steel column shower*, washfountains, group shower.

Ebco Mfg. Co. 336
Water coolers: bottle and pressure-type, recessed*, and bubbling; dehumidifiers*.

Scott Paper Co. 1807
Washroom towels, single- and multi-fold; industrial wipers; toilet tissue rolls.

Steiner Co. 511
Dispensers for paper towels, continuous cloth towels, toilet tissue, seat covers, and soap, paper towels, wipers.

Sugar Beet Products Co. 905
Dispensers for soaps and skin cleansers.

Halsey W. Taylor Co. 1557
Coolers: cafeteria, pressure, bottle, and compartment types; drinking fountains: battery, wall-hung, and pedestal.

20 Mule Team Products Div., U.S. Borax & Chemical Corp. 112
Recessed stainless steel powdered hand soap dispensers*; wall- and basin-mounted dispensers, stainless steel and baked enamel.

West Chemical Products, Inc. 1808
Paper-towel dispensing cabinets.

Maintenance Today

Now, for the first time, you can see how over 300 plants manage their maintenance and electrical operations—what their problems are and the way they're solving them.

How? Get two FACTORY reprints:

A162—Electrical Management and Maintenance Today (50¢)

A163—Maintenance Management Practices Today (50¢)

Also, for complete data on which these two reports are based, you'll want. . .

Complete Survey Data—Maintenance and Electrical (over 200 pages, $5.25 per copy).

Order from:

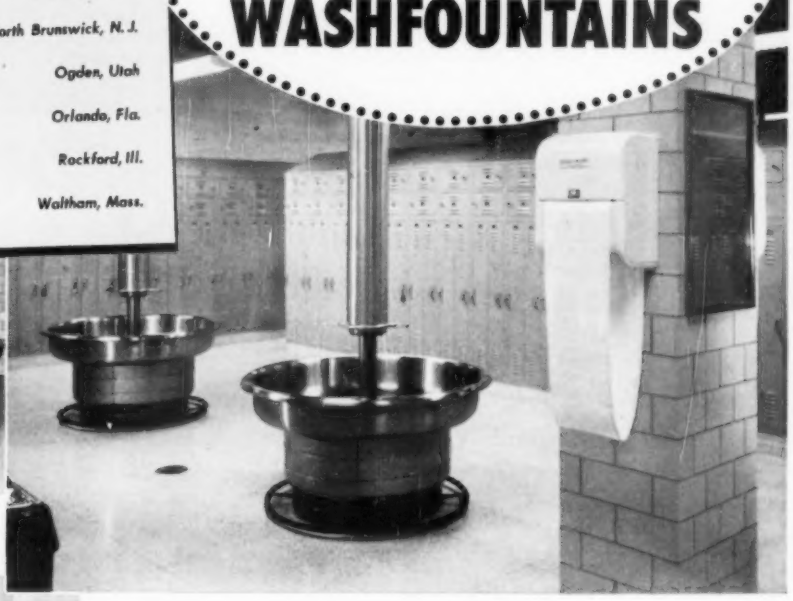
FACTORY Reader Service
330 West 42nd St.
New York 36, N. Y.

FACTORY Selected Top Plants of 1958

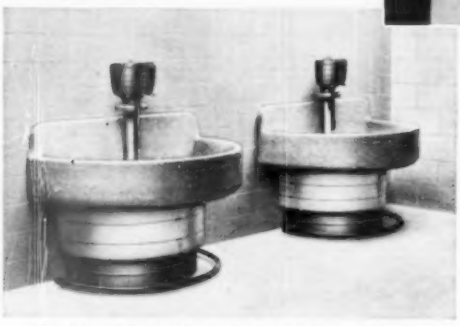
EIGHT OF 10 TOP PLANTS OF 1958

Automatic Electric Company	Northlake, Ill.
Beckman-Helipot Corporation	Newport Beach, Cal.
Chrysler Corporation	Twinsburg, Ohio
Johnson & Johnson	North Brunswick, N. J.
Marquardt Aircraft Company	Ogden, Utah
The Martin Company	Orlando, Fla.
National Lock Company	Rockford, Ill.
Polaroid Corporation	Waltham, Mass.

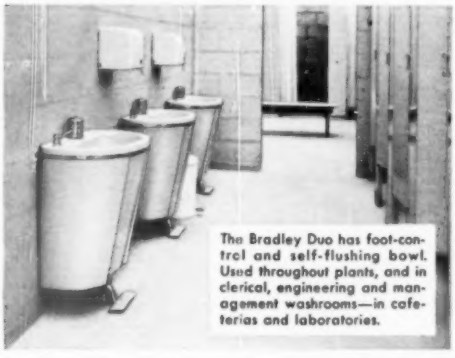
80 percent are equipped with BRADLEY WASHFOUNTAINS



Stainless Steel is becoming more and more popular as in the Automatic Electric Plant where 78 Washfountains of this 54-in. circular model were installed.



The Semi-circular Washfountains (wall type) shown are precast stone, part of new Martin Company installation, Orlando, Florida plant.



The Bradley Duo has foot-control and self-flushing bowl. Used throughout plants, and in clerical, engineering and management washrooms—in cafeterias and laboratories.

Industry provides the very best in sanitary washing facilities

Of nearly 1,000 U. S. industrial plants built in 1957, 10 were placed on the yearly "Honor Roll" by the editorial staff of FACTORY MANAGEMENT AND MAINTENANCE magazine.

Of these 80 percent included Bradley Washfountains—because of lower installation costs, ample time-saving facilities, and maximum protection against spread of contagious infections.

Each Bradley serves groups—yet requires but a bit more water than a single person wash basin, and only *one set* of piping connections for each *8 to 10 person Washfountain.*

Maintenance is cut—no faucets to adjust or replace—and since the bowl is self-flushing, unsanitary collection of water is prevented.

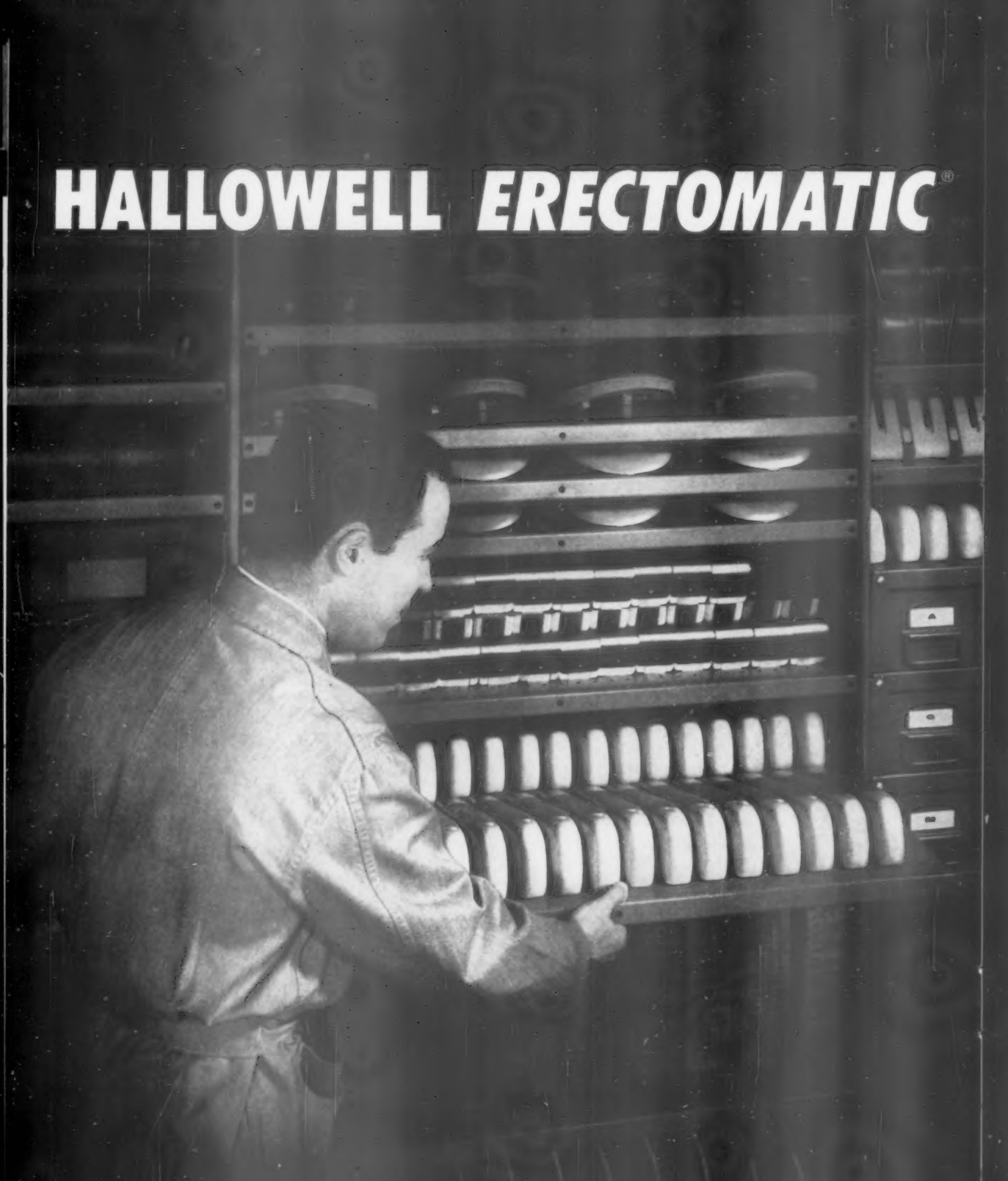
If new plant is not now under consideration, you can improve or enlarge your washing facilities with the same type of Bradley Washfountain that FACTORY'S top plants prefer . . . Write for helpful Catalog 5601 . . .
BRADLEY WASHFOUNTAIN CO., 2215 W. Michigan St., Milwaukee 1, Wisconsin.

Write for Catalog 5601

BRADLEY Washfountains

(Distributed by Plumbing Wholesalers)

HALLOWELL *ERECTOMATIC*®



Individually adjustable shelves allow as much as a 20% saving in floor space, with ERECTOMATIC shelving. To raise or lower, shelves pull straight out without tilting—and without disturbing contents. In addition, every ERECTOMATIC shelf has more usable space than shelves of conventional units.

SHELVING...

stores more in less space

- ... for a leading Automotive Manufacturer—storage area cut 25% in a new plant
- ... for a West Coast Drug Wholesaler—$28,000 saved in space and labor
- ... for a Tool and Die Maker—full cost of ERECTOMATIC SHELVING saved in one year

ERECTOMATIC SHELVING is *designed* to save your storage dollars three ways:

Quick Installation—ERECTOMATIC goes up fast . . . costs less to assemble.

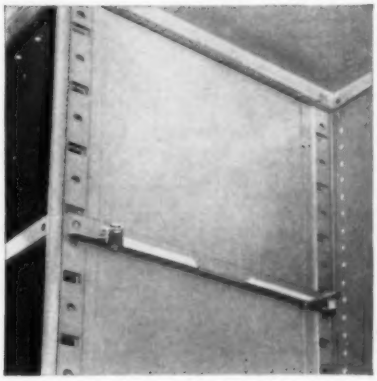
Adjustability—ERECTOMATIC shelves are individually adjustable to meet size and weight of changing loads. Waste air space is eliminated. Easy straight-in, straight-out shelf changing makes ERECTOMATIC the most adaptable storage system you can find.

Annual Costs—Since an ERECTOMATIC installation holds material more efficiently, you need less floor space for storage, with resulting annual savings.

Your Columbia-Hallowell dealer can give you complete details, or write for fully illustrated literature to Columbia-Hallowell Division, SPS, Jenkintown 11, Pennsylvania, or SPS Western, Santa Ana, California.

Some of the exclusive *ERECTOMATIC*® features:

FAST ASSEMBLY. Just position the shelf supports, insert the shelf, and press the unique locking device. No tools are needed at any time.



FULL-DEPTH SHELF SUPPORT. The load is distributed over the full depth of the shelf, rather than supported only at front and rear.

FULL USE OF SHELF AREA. Beaded front posts make full width of shelf usable . . . won't snag clothes, hands or stored goods.

SEE *ERECTOMATIC*® and the Hallowell line of SHOP EQUIPMENT at the Plant Maintenance Show, Jan. 26-29. Booth 1104.

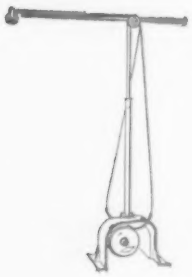
SPS Jenkintown • Pennsylvania

Standard Pressed Steel Co. • The Cleveland Cap Screw Co. • Columbia Steel Equipment Co. • National Machine Products Co. • Nutt-Shel Co. • SPS Western • Standco Canada Ltd. • Unbrako Socket Screw Co., Ltd.

For more facts Circle 550 on Reader Service Card

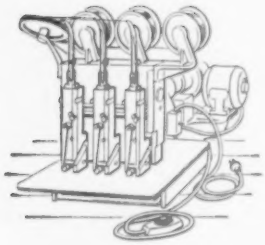
CLOSURE IDEA BULLETIN

For Users of Fibreboard Boxes

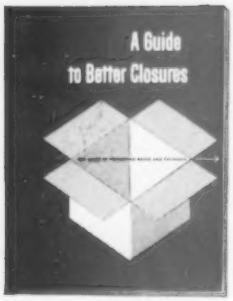


Users needing low-cost, high-volume closure of all types of fibreboard boxes find characteristics of wire stitching method particularly advantageous...economical ...continuous long runs without frequent need to reload...coils hold enough wire for many thousands of stitches.

Wire tangling, snagging, eliminated by positive brake action on Acme Steel 25 and 50 lb. coil holders...machine or floor mounted. Model P1A0 coil holder for single head stitchers holds two 50 lb. coils of wire...wire feeds from first coil while second coil is ready for instant threading ...floor standing model...does not have to be fastened in any manner to floor or stitcher. More details in AD-159.



Toy manufacturer uses Acme Steel Wire Stitcher, Model 600 Champion, to stitch plastic bubble to display card as protection over toy accordion. Stitched cards assemble faster, stay intact better. Operation described completely in W4-2.



Free Booklet, "A Guide to Better Closures" ...an impartial report on glue, tape, staple and wire stitching closure methods. Points the way toward savings, superior product protection...send for your free copy today.

Contact your Acme Idea Man for additional information and ideas on better ways in which wire stitching can serve. His intensive training, backed by Acme Steel Company's 75 years of experience with closure methods, are at your service. Write Dept. FAW-19, Acme Steel Products Division, Acme Steel Company, Chicago 27, Illinois, for information on the complete Acme Steel line of box, book and metal stitchers.

ACME STEEL WIRE STITCHING

For more facts Circle 551 on Reader Service Card

A YALE PRODUCT FOR BOOSTING PROFITS

ONE YALE TRUCK DOES THREE JOBS ECONOMICALLY

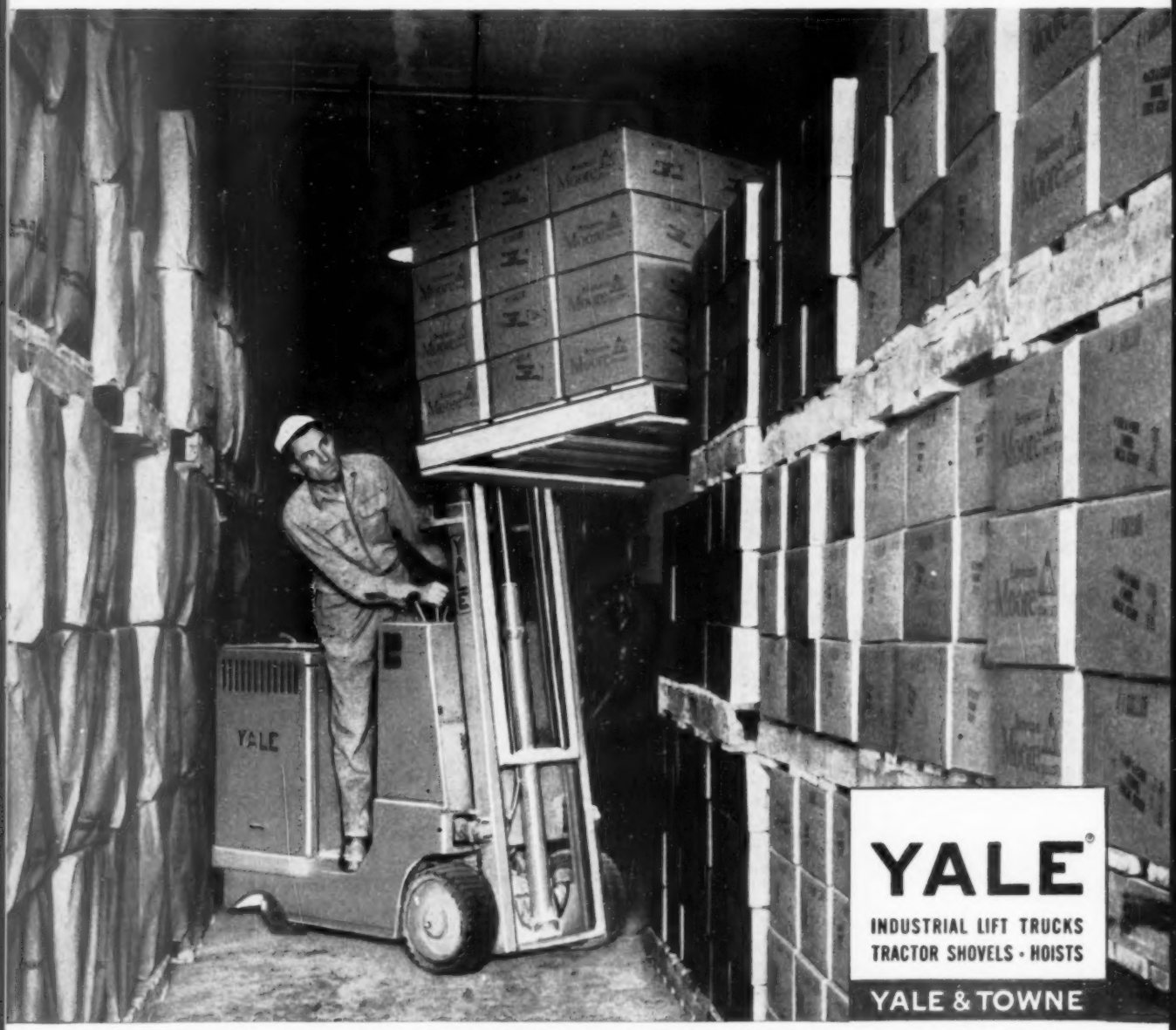
K-46 equally efficient in warehousing, on loading ramp, for mounting and dismounting operations

If your requirements call for a one-truck fleet, the versatile Yale K-46 is the truck for you!

Three features give this economical Yale truck an extraordinary degree of usefulness. *Compactness* makes it a good narrow-aisle truck. *Maneuverability* makes it the perfect truck for loading and unloading on the delivery ramp. *Standup cockpit* permits easy, fast mounting and dismounting... gives the driver a clearer view for loading operations and aisle movement.

The K-46 is the ideal truck for profitable short cycle operations. Compact as it is, this economical truck has *all* the features of the large Yale electric trucks. Exclusive Magnetic Cam-O-Tactor for controlled acceleration and smooth travel—rugged durability—low-cost operation—dead-man control and other safety features. Capacities, 2,000 and 3,000 lbs.

For information about this stand-up electric truck, a cost-cutter in Yale's line of electric trucks (capacities 1,000 to 200,000 lbs.), call your Yale representative, or write for brochure #5112. The Yale & Towne Manufacturing Co., Yale Materials Handling Division, Philadelphia 15, Pennsylvania, Dept. KT 1-H.



Yale Materials Handling Division, a division of The Yale & Towne Manufacturing Company. **Manufacturing Plants:** Philadelphia, Pa., San Leandro, Calif., Forrest City, Ark. **Products:** Gasoline, Electric, Diesel and LP-Gas Industrial Lift Trucks • Worksavers • Warehousers • Hand Trucks • Industrial Tractor Shovels • Hand, Air and Electric Hoists

For more facts Circle 552 on Reader Service Card

Complete Conference Program

Monday, Jan. 26, 10:30 a.m.
Public Auditorium (All Sessions)

1. Our Maintenance Management System—Chairman: **L. C. Morrow,** consulting editor, FACTORY, New York, general chairman of the Conference. Speaker: **Oscar W. Graveley,** director of maintenance, Electro Metallurgical Co., Div. of Union Carbide Corp., Niagara Falls.

Monday, Jan. 26, 7:30 p.m.
(Concurrent Sessions)

2. Industrial Engineering in Maintenance—Chairman: **E. A. Wroblewski,** industrial engineer, International Minerals & Chemical Corp., Skokie, Ill. Speaker: **J. U. Saum,** manager, Maintenance Management Controls Branch, Bureau of Yards and Docks, Navy Dept., Washington.

3. Maintenance Materials—Chairman: **Richard H. Morris,** editorial director, "Plant Engineering," Barrington, Ill. Speaker: **Kenneth N. Banthin,** supervisor of construction and maintenance, Food Casing Div., Clearing Plants, Visking Co., Div. of Union Carbide Corp., Chicago.

4. Maintaining Electronic and Other Control Systems—Chairman: **G. C. Quinn,** editor, electrical services, FACTORY, New York. Speakers: **Charles E. Quick,** industrial power planning engineer, The Detroit Edison Co., Detroit; and **Charles Suchanek,** superintendent of maintenance, Republic Aviation Corp., Farmingdale, N.Y.

5. A Successful Case in Planning and Scheduling—Chairman: **Jodie Isenhower,** head of maintenance coordination, Humble Oil & Refining Co., Baytown, Tex. Speaker: **Paul Taylor,** maintenance superintendent, Chemstrand Corp., Decatur, Ala.

6. Economical Use of Electric Power—Chairman: **William C. Wallin,** chief, Plant Engineering Department, Western Electric Co., Inc., North Carolina Works, Winston-Salem. Speaker: **P. A. Dethloff,** building superintendent, Continental Can Co., Inc., Research and Development Dept., Metal Div., Chicago.

7. Setting and Maintaining Sanitation Objectives—Chairman: **Richard A. Harvey,** plant engineer, Valve Div., Thompson Products, Inc., Cleveland. Speaker: **Kenneth Bowman,** supervisor, Sanitation Department, Delco-Remy, Anderson, Ind.

8. Why Safety Is Essential, and How to Secure It—Chairman: **Edward J. Clement,** executive editor, "Mill & Factory," New York. Speaker: **W. C. Cooley,** assistant department manager, Maintenance, Plant Engineering Department, Lockheed Aircraft Corp., Missile Systems Div., Sunnyvale, Calif.

9. Preventive Maintenance—Chairman: **Robert W. Snow,** staff specialist, Maintenance Planning, Industrial Engineering Div., Procter & Gamble Co., Cincinnati. Speakers: **L. H. Clark,** manager, manufacturing engineering and facilities, Medium Transformer Dept., General Electric Co., Rome, Ga.; and **E. C. Denny,** engineer, "Courier-Journal and Times," Louisville, Ky.

10. Arc Welding in Maintenance—Chairman: **James H. Poore,** maintenance superintendent, Ashland Oil and Refining Co., Ashland, Ky. Speaker: **Robert Wilson,** director of application engineering, The Lincoln Electric Co., Cleveland.

11. Maintaining Utilities—Chairman: **Emmett C. Hartley,** plant engineer, Parker-Hannifin Corp., Cleveland. Speaker: **A. F. De Long,** plant engineer, Electric Storage Battery Co., Exide Industrial Div., Philadelphia.

Tuesday, Jan. 27, 9:30 a.m.
(Concurrent Sessions)

12. Basic Procedures in Building Maintenance—Chairman: **F. R. Malmgren,** manager of buildings and maintenance, A. B. Dick Co., Chicago. Speaker: **G. A. McFadden,** building engineer, Nationwide Insurance, Inc., Columbus, Ohio.

13. Training—Chairman: **Howard T. Lentz,** training coordinator, Allegheny Ludlum Steel Corp., Brackenridge, Pa. Speaker: **Russell W. Davis,** manager of personnel relations, Pittsburgh Coke & Chemical Co., Pittsburgh.

14. Designing and Administering a Preventive Program for the Maintenance of Control Instruments—Chairman: **M. S. MacGillivray,** engineering services manager, Canadian Industries Ltd., Montreal, Quebec. Speaker: **J. J. Kelly,** maintenance superintendent, Panellit Service Corp., Skokie, Ill.

15. Labor Relations in Union Shops—Chairman: **Charles W. Ufford,** director of industrial relations, The Warner & Swasey Co., Cleveland. Panel: C. C. Carmine, supervisor, maintenance and construction, Tidewater Oil Co., Associated, Calif.; W. E. Fore, plant engineer, North American Aviation, Los Angeles; George J. Martin, director, contract engineering, Baltimore Contractors, Baltimore, Md.

16. Counteracting Air and Water Pollution—Chairman: **Harley R. Hughes,** manager, Plant Engineering Services, Colgate-Palmolive Co., New York. Speakers: (Air Pollution) **O. C. Thompson,** coordinator, Waste Abatement, Union Carbide Chemicals Co., Div. of Union Carbide Corp., South Charleston, W. Va.; and (Water Pollution) **Grant A. Pettit,** industrial waste engineer, Armco Steel Corp., Middletown, O.

17. Maintenance in Metal-Working and Metal-Fabricating Plants (Round Table)—Chairman: **E. F. Wertzler,** manager of plant engineering, Standard Transmission Plant, Ford Motor Co., Dearborn, Mich. Assistants: **M. E. Bartling,** preventive maintenance supervisor, Standard Transmission Plant, Ford Motor Co.; and **D. A. Kerry,** plant engineer, Ford Transmission and Chassis Div., Livonia, Mich.

18. Maintenance of Research and Development Laboratories (Round Table)—Chairman: **G. W. Lees, Jr.,** plant engineer, Bell Telephone Laboratories, Inc., Murray Hill, N.J. Assistants: **John D. Henze,** plant engineer, The Mennen Co., Morristown, N.J.; **Patrick Norelli,** super-

This resistance welder has 48 Aeroquip Hose Lines giving long, trouble-free service conveying hydraulic fluids. Hose lines were made up in the plant using Aeroquip Hose and Reusable Fittings. No special machines are needed to assemble Aeroquip Hose Lines. Assemblies can be made in minutes using a wrench and a vise.

Aeroquip Hose Lines Give Long Service on Plant Equipment

at Hayes Industries, Inc.

Use of Aeroquip Flexible Hose Lines has increased service life of hydraulic and air lines on plant equipment at Hayes Industries' Jackson, Michigan, plant. Replacing steel tubing on one hydraulic machine, Aeroquip Hose Lines have given trouble-free service for more than 4½ years.

All replacement hose lines are assembled quickly right in Hayes' plant from Aeroquip Bulk Hose and Reusable Fittings. Equipment downtime is minimized and hose line stock is limited to a few coils of hose and spare fittings.

Standardize on Aeroquip Hose Lines for your fluid line replacements. You save time and money. Call the Aeroquip Distributor listed in your Yellow Page Phone Book or write us.

See Aeroquip Products on Display BOOTHS 1134-6 Plant Maintenance Show January 26-29, Cleveland, Ohio

Aeroquip

AEROQUIP CORPORATION, JACKSON, MICHIGAN

INDUSTRIAL DIVISION, VAN WERT, OHIO • WESTERN DIVISION, BURBANK, CALIFORNIA
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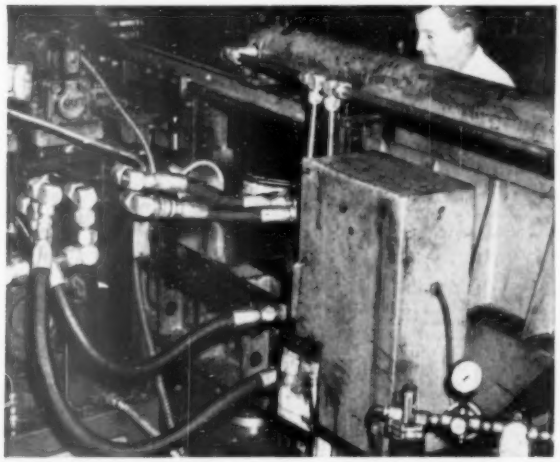
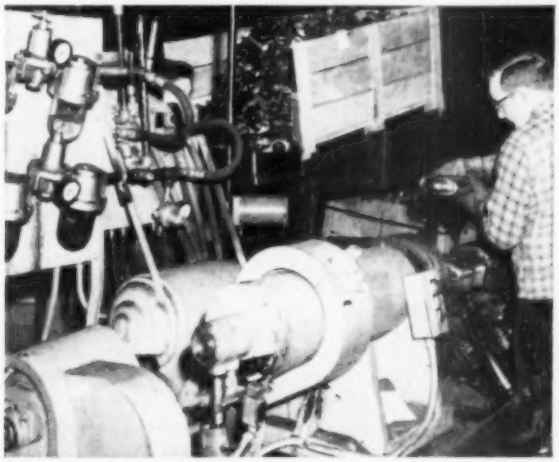


The high pressure hydraulic lines on this lock seam machine replaced steel tubing over 4½ years ago and are still in good condition despite constant vibration.



Air lines on this head roll machine in Hayes' Jackson plant are Aeroquip medium pressure and high pressure hose lines. They withstand air surges and vibration.

Just off the press- All about the Thoro System Products

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intendent of facilities, Westinghouse Electric Corp., Research Laboratory, Pittsburgh; and **Frank J. Ward,** assistant superintendent, Esso Research and Engrg. Co., Linden, N.J.

19. Maintenance in Petroleum Processing Plants (Round Table)—Chairman: **R. D. Humphreys,** maintenance superintendent, Canadian Oil Companies, Ltd., Sarnia Refinery, Corunna, Ontario.

20. Maintenance in Nuclear Plants (Round Table)—Chairman: **Don Hagen,** industrial engineer, Chemical Processing Dept., Hanford Atomic Products Operation, General Electric Co., Richland, Wash.

21. Maintenance in Abrasive Products Plants (Round Table)—Chairman: **Warren Fogelberg,** plant manager, Ideal Cement Company, Baton Rouge.

Tuesday, Jan. 27, 3 p.m.
(Concurrent Sessions)

22. Lubrication—Chairman: **Harold W. Miller,** chief engineer, The Carpenter Steel Co., Reading, Pa. Speaker: **J. H. Fuller,** consultant supervisor, Engineering Dept., E. I. duPont de Nemours & Co., Inc., Wilmington.

23. Maintenance by Outside Contractors—Chairman: **Marshall Dyer,** assistant to the president, Trundle Consultants, Inc., Cleveland. Speakers: **Norton M. Brown,** plant engineer, Pennsalt Chemicals Corp., Wyandotte, Mich.; and **Phillip M. Kimmel,** plant engineering supervisor, Eastman Kodak Co., Hawk-Eye Works, Rochester, N.Y.

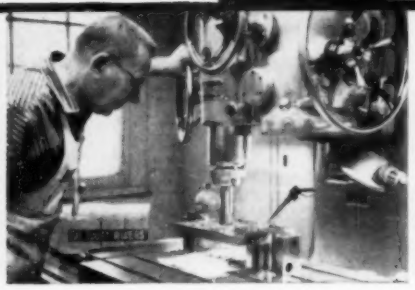
24. Maintenance in Small Plants (Up to 50 Maintenance Employees)—Chairman: **Rolland P. Crane,** plant engineer, The Duraloy Co., Scottdale, Pa. Speakers: **N. R. Crisler,** maintenance superintendent, Diamond Alkali Co., Muscle Shoals Plant, Sheffield, Ala.; and **Milton M. Smucker,** superintendent of maintenance and development, North Vernon Div., Thompson Industries, Inc., North Vernon, Ind.

Turn the page

Mr. A. F. Fischer, Jr., Plant Engineer and Purchasing Agent of Magnetic Metals Company, Camden, New Jersey, buys Scott Wipers because:

"Scott Wipers maintain absolute cleanliness in precision tool and die work . . . save on scratched rejects and reduce fire hazard of oil-soaked rags at Magnetic Metals Company"

Intricate dies built for precision stamping of magnetic core parts must meet tolerances of .0005". No chance of scratched rejects when Scott Wipers, fresh from the box, remove solvents and oils.



Easy way to reduce risk of cuts and scratches to workers—use Scott Wipers to catch chips at jib borer. Operator merely gathers all four corners of paper Wiper and discards into nearby receptacle. Less chance of fire, too. Wipers are gathered twice daily and incinerated immediately.

Precise measurements of die parts are a cinch when Scott Wipers clean surface plates. These patented "Perf-embossed" wipers scoop up the tiniest particles of dust and dirt—leave absolutely no lint.

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TENNANT Model 40 Sweeper

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FOR CONGESTED AREAS—A compact NEW walk-behind Sweeper (Model 40). Cleans 32" path, turns in its own tracks. *Equals "big sweeper" performance for* CLEAN *sweeping!* Sweeps 8 to 20,000 sq. ft. per hour in most plants . . . or 2 to 5 times faster than a man with a broom. Very powerful brush-and-vacuum system: out-performs any other sweeper of its size for clean, dust-free work. Low priced.

FOR SMALL PLANTS — Versatile space-saving Sweeper (Model 50) cleans 40" path on the run. Travels at 1½ to 8 mph, *sweeping 3 to 7 times faster than is possible by hand.* Rider-type; easy to use. Combined brush and vacuum system instantly removes chips, sand, debris, dirt and dust that pushbrooms can't pick up.

Compact design and easy steering make the "50" ideal for both congested and open areas. Often pays for itself in 9 to 14 months. Gas or LP-gas models.

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Excellent dust control and huge capacity make it ideal for yards, docks, salvage work, large aisles, etc. Nothing else like it!

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CONFERENCE PROGRAM

Begins on page 182

25. Maintenance in Medium-Size Plants (Up to 500 Maintenance Employees)—Chairman: **Shelton A. Musser,** chief, Technical Area Div., The Zia Co., Los Alamos, N. Mex. Speaker: **J. M. Conrow,** works engineer, Thiokol Chemical Corp., Longhorn Div., Marshall, Tex.

26. Maintenance in Large Plants (More than 500 Maintenance Employees)—Chairman: **C. Gale Kiplinger,** chairman, Maintenance Steering Committee, Allied Chemical & Dye Corp., National Aniline Div., Buffalo. Speaker: **R. F. Bobbitt,** maintenance superintendent, Union Carbide Chemicals Co., Texas City.

27. Maintenance in Chemical Plants (Round Table)—Chairman: **Ralph N. Price,** superintendent of maintenance, Columbia-Southern Chemical Corp., subsidiary of Pittsburgh Plate Glass Co., Corpus Christi.

28. Maintenance in Foundries: Iron, Steel, Non-Ferrous (Round Table)—Chairman: **Philip A. Repino,** plant engineer, Lebanon Steel Foundry, Lebanon, Pa.

29. Maintenance in Assembly Plants (Round Table)—Chairman: **John W. Green,** plant facilities engineer, Plant Engineering Div., Leeds & Northrup Co., North Wales, Pa.

30. Maintenance in Electrical Manufacturing Plants (Round Table)—Chairman: **C. J. Zelter, Jr.,** plant engineer, East Pittsburgh Div., Westinghouse Electric Corp.

31. Maintenance in Pulp and Paper Mills (Round Table)—Chairman: **Linton M. Raymond,** planning engineer, Mechanical Dept., S. D. Warren Co., Westbrook, Me.

Wednesday, Jan. 28, 9:30 a.m. (Concurrent Sessions)

Repeats of Sessions 2, 3, 4, 5, 6, 7, 8, 9, 10, 11.

Wednesday, Jan. 28, 7:30 p.m. (Concurrent Sessions)

Repeats of Sessions 12, 13, 14, 15, 16, 22, 23, 24, 25, 26.

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Wherever necessary, A. W. Super Diamond rolled steel floor plate can be sheared, formed, welded, and easily matched. The arrangement of the unique pattern allows you to bend it at any place.

This is a heavy duty floor plate that will last for years . . . and provide a safe, non-skid footing. No chipping, splintering or cracking . . . *and* no skidding. You save on cleaning costs, too . . . because A. W. Super Diamond is easily swept or mopped *from any direction*. It drains freely . . . no pockets to hold dirt.

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Here's a fast, systematic way for addressing multiple shipments. In one easy motion, you can imprint both a facsimile label and customer's address directly on a carton. 30 to 40 cartons can be addressed in a minute. No labels to type or apply; no ink brushes and stencilboards to wield. Facsimile labels are sharp and clear, yet can be easily blocked out for re-handling by consignee.

All that's needed is a Weber handprinter and Kustom-Kut stencil. Stencils are die-cut with facsimile of your label. All you do is type the customer's address on the stencil and attach to the printer. Fast, neat, systematic and inexpensive. Write for full details on the Weber Facsimile-Label System.

Good for product identification marking too.

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Weber Industrial Park
Mount Prospect, Illinois

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Acme Steel Products Div. 149, 180
Acme Visible Records Inc. 129
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Alemite Division,
Stewart-Warner Corp. 161
Allis-Chalmers
Mfg. Co. 155, 156, 157, 158
Engine-Material Handling Div..... 141
American District Telegraph Co. 127
Arro Expansion Bolt Co. 164
Barreled Sunlight
Paint Company 132, 133
Bassick Company 143
Binks Manufacturing Company 162
Black & Decker Mfg. Co. 151
Boston Gear Works 153
Bradley Washfountain Co. 177
Byers Company, A. M. 169
Commercial Filters Corporation 173
Eagle Manufacturing Co. 175
Faultless Caster Corp. 126
Felters Company 144, 145
Finnell System, Inc. 190
Furnas Electric Company 160
General Electric Lamp Company..... 189
Globe Company 152
Hannay & Son, Inc., C. B. 174
Homestead Valve Mfg. Co. 163
Kidde & Company, Inc. Walter 136
Logan Company 176
Lunkenheimer Company 147
Motorola Communications &
Electronics Inc. 168
Multi-Clean Products Inc. 139
Pittsburgh Corning Corporation 171
Ramset Fastening System 170
Ridge Tool Company 130, 131
Scott Paper Company 185
Simplex Wire & Cable Company 135
Skil Corporation 125
Spencer Turbine Company 154
Standard Dry Wall Products Inc. 184
Standard Pressed Steel Co. 178, 179
Steiner Company 159
Structoglas Division, International
Molded Plastics Inc. 172
Sugar Beet Products Co. 140
Tennant Company, G. H. 186
Texas Company 128
Toledo Pipe Threading
Machine Co. 165
Torit Manufacturing Co. 142
Tranter Mfg. Co. 137, 138
Valdura Paint Division,
American-Marietta Co. 150
Weber Addressing Machine Co. 188
Westinghouse Electric Corp. 166, 167
Yale & Towne Manufacturing Co. .. 181

"97% of our General Electric Power Groove Lamps are still going strong after 6500 hours!"

SAYS ERICKSON TOOL COMPANY, SOLON, OHIO

ERICKSON TOOL COMPANY
34350 SOLON ROAD
SOLON, OHIO

December 22, 1958

Mr. O. D. Dobras
Application Engineering
General Electric Lamp Division
Nela Park, Cleveland 12, Ohio

Dear Mr. Dobras:

Thanks for your continued interest in our Power Groove lighting system. You have more and more reason to be proud of it.

You told us these lamps had a useful life expectancy of 5,000 hours. Now, after 15 months, or a full 6,500 hours of use, only 3% have burned out! In my opinion this is an excellent record of performance.

As you can tell, we're still mighty pleased we selected Power Grooves for our lighting. They've helped us maintain our high-quality production standards (the men think they're great), and they're practically maintenance-free.

Sincerely,

S. S. Benjamin, Vice President
Erickson Tool Company

SSB/dmw

G-E POWER GROOVES give nearly twice as much light as high output fluorescents—2½ times as much as slimlines. You can get more light per fixture, with fewer parts to maintain, and save 5% to 20% on original investment.

FREE! NEW 24-PAGE BOOK entitled "21 Industrial Lighting Problems Solved With Power Grooves". This illustrated book gives you the whole story on G-E Power Groove Lamp design—plus specific details on how to get the highest, most economical lighting levels. For your copy, write: General Electric Co., Large Lamp Dept. C-901, Nela Park, Cleveland 12, Ohio.

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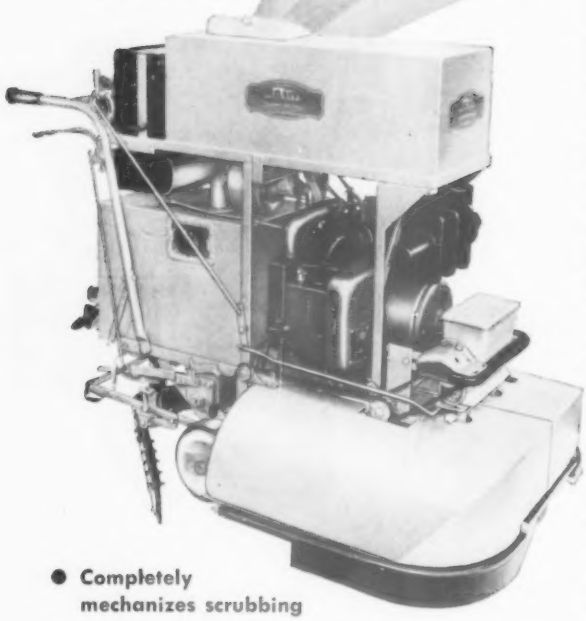
Self-Powered
COMBINATION SCRUBBER-VAC
Cleans Vast-Area Floors "By the Mile"

Monoxide Eliminator, Powder Dispenser, and Rinse Assembly are accessories



- **Completely mechanizes scrubbing**
- **Coverage up to 24,400 sq. ft. per hour!**
- **Mounts a SELF-STARTING gasoline engine**

This *all-in-one* cleaning unit, *Finnell's 218G Gasoline-Powered Combination Scrubber-Vac,* is indeed the answer to today's need for increasing output per man-hour on vast-area scrubbing. *The 218G completely mechanizes scrubbing* — applies the cleanser, scrubs, flush-rinses if required, and picks up (damp-dries the floor) — *all in one operation!* Independence from power lines permits the machine to go wherever the operator guides it . . . working in and out of production areas with ease . . . *scrubbing continuously.*

Maintenance men appreciate the labor-saving features of this unit. The gasoline engine starts quickly and easily by pressing the starter button. And there are no switches to set for *fast* or *slow* — slight pressure of the hand on clutch lever adjusts speed to desired rate (up to 136 fpm). Two 18-inch brushes give a 36-inch scrubbing surface. *One engine* (2 cyl., 4 cycle, up to 10.1 hp maximum, and air-cooled) operates all working parts. The powerful vac performs quietly.

Whatever the area of your floors, find out what *you* would save with a *Combination Scrubber-Vac. Finnell* makes *self-powered* models, gasoline or propane operated, in 18, 30, and 36-inch sizes, and also *electric* models in sizes to meet specific needs. It's good to know too that *a Finnell Floor Specialist and Engineer is nearby* to help train your maintenance operators in the proper use of *Finnell Equipment* and to make periodic check-ups. For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2501 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

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Originators of Power Scrubbing and Polishing Machines

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BRANCHES IN ALL PRINCIPAL CITIES

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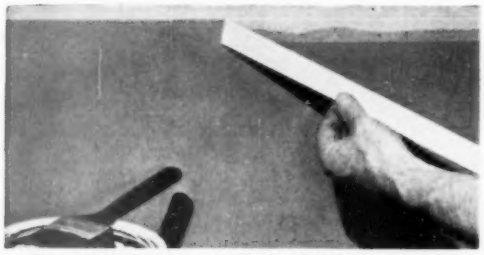
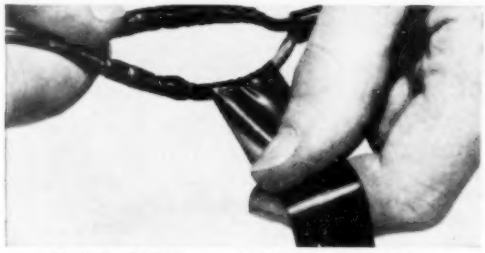


Paper-backed tapes . . . masking, protecting, packaging.



Plastic-backed tapes . . . insulating, sealing, splicing.

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See the versatility of modern Polyken adhesive tapes. All have solved tough production problems . . . economically. For help with your problem, look in the yellow pages of your phone book for the Polyken Industrial Tape Distributor nearest you. Or write to the Polyken Sales Division. 309 W. Jackson Blvd., Chicago 6, Illinois. Dept. FM-1.

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INDUSTRIAL TAPES

THE KENDALL COMPANY
Polyken Sales Division

Driver records his own jobs (facing page). It's an . . .

Honest-John Handling Incentive

By putting materials-handling workers on their honor, Exide boosts efficiency, cuts indirect labor costs, paves the way for other indirect incentives.

HONOR IS THE KEY to successful materials handling incentives here at Exide Industrial Division. The plan (see check sheets, facing page) has been working for two years for our in-plant trucking and materials handling.

Incentives of this sort are uncommon. But the honor system feature of Exide's plan is almost unheard of. Idea is that each man keeps his own time record. Although some people told us this was tantamount to handing our men an open cash register, the system has a good set of built-in checks and balances. And—most important—it works.

The plan has helped Exide boost the materials-handling work load by 10% and at the same time has resulted in reassignment of eight of the 40 men formerly needed for handling, shipping, and supply operations. That's not all. The plan:

. . . *Eliminates* discontent where two different methods of payment (incentive and daywork) are operating side by side.

. . . *Demonstrates* that workers on indirect factory operations respond to motivation to increase their productivity much the same as workers on direct labor operations.

. . . *Offers* promise for later use in other indirect operations.

By ERVIN SELTZER
Manager, Industrial Engineering
Exide Industrial Division
The Electric Storage Battery Company
Philadelphia

HOW WE SET UP OUR PLAN

The scarcity of materials handling incentives warned us that it wasn't going to be an easy matter to put materials handling on an incentive basis. So we considered long and carefully first.

Turn the page

INDUSTRIAL & PLATFORM TRUCK TALLY SHEET - DEPT. 21

10/57 Form 5-6110

Truck Operator: F. MAHADAS	Clock Number: 4872	Date: 3-14-58	Sheet Number: 1
		Truck Type: FORK	Truck Number: F-20
		Location Assignment: Pasting	

OPERATION (Incl. Return Trip)	STD./TRIP	RATE NO.	NUMBER OF TRIPS MADE	TOTAL UNITS
PLACE TRUCK IN GARAGE	7.3	(161)	//	
GET TRUCK FROM GARAGE	7.3	(162)	//	
" " GRID STOREROOM	4.1	(96)	~~HH~~ ~~HH~~ ~~HH~~ ~~HH~~ ~~HH~~ ////	
" " FORGING	3.0	(164)		
" " SKID CLEANER	7.2	(189)	~~HH~~ ////	
" " SHIPPING	9.0	(230)	///	
" " CASTING	4.2	(231)	~~HH~~ ~~HH~~ //	
" " BOX YARD	12.5	(232)		
RETURN WITH LOAD	1.3	(22)	~~HH~~ ///	
LOOK FOR SKIDS				

Approved by

GRAND TOTAL UNITS

Trucker's honor-system tally sheet is...

MATERIAL HANDLING
STANDARD DATA SHEET
INDUSTRIAL FORK & PLATFORM LIFT TRUCKS

Study No. 95
Dept. 21
Date 3-26-56

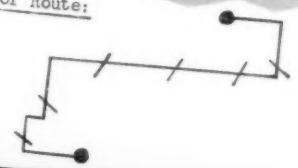
Location: PASTING DEPT. Type Truck: FORK Truck No.: 14

Operation - TRANSPORT FROM PASTING DEPT. TO PLATE STOREROOM Operator: F. MAHADAS Operator No.:

Distance Traveled - 516 ft. Material - PLATES

BASIC TRUCK MOTIONS	STANDARD	NO. OCCUR.	TIME IN MINUTES EMPTY	LOADED TO 4000 LBS.	TOTAL TIME
1. Travel Time	Empty .0023/ft. Loaded.0027/ft. Empty .050	516 ft.	1.187	1.393	

Diagram or Route:



Total Basic Time per Trip	4.980
Allowed Time - 21.2%	1.058
Total Standard Time per Trip	6.038
Unit Value	6.0
Remarks:	

...measured against standard job data.

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SAFE
TO USE!

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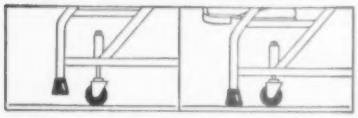
Safety-Step LADDERS

PYRAMID
DESIGN
automatically centers the body, and automatically locks to the floor. An exclusive Ballymore design.



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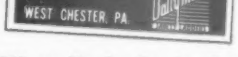
ABOVE-FLOOR SAFETY

LOOK FOR THIS LABEL TO BE SURE IT'S THE BEST



194 Circle 562 on Reader Service Card

Here's the background of our new incentive plan: Exide's 20-acre Philadelphia plant is the largest industrial storage battery plant in the world. Essentially it's a giant job shop. There are few opportunities for conveyor work. And as there's a lot of lead in storage batteries, the tonnage we handle is very high. Most of our 1000-odd employees are working on direct operations or incentives.

Preliminary study showed us that certain conditions were necessary in planning for a good materials handling incentive:

- Operating methods must be defined clearly.
- Time to perform an operation must be measured and set.
- Administration of the incentive is important.

While method and time studies can work out the first two requirements, there are discouraging problems in the third requirement. Getting a count to pay the correct incentive earnings is the sticker. It's the major reason why indirect incentives are scarce.

The usual timekeeping methods simply fall down because an enormous variety of events may occur in unpredictable combinations. Many plants have tried premium plans that tie the indirect worker's pay to the group he services. This sounds fair, but offers disadvantages. This type of plan fails to fulfill the first two requirements stated above—and can prove a source of trouble as time goes on. It's difficult, for instance, to change standards to meet changing conditions. And most production work is dynamic, involving ever-changing designs, materials, machines, and schedules.

We worked with the Battery Workers Union, Local 113, I.U.E., AFL-CIO, to avoid these pitfalls. And as a result we now have a basis for extending incentives to many other indirect operations by relying on the honor-system approach to getting counts and to controlling operation of the plan.

In terms of incentives, union contracts and company practices themselves frequently create a framework that simply is not flexible enough to permit successful pioneering. Job jurisdiction, job assignment practices, seniority problems, local customs—any or all could develop into permanent obstacles. So an early step was to hold supervisory conferences to determine how the new plan might operate best. A joint company-union committee worked out these problems.

WHAT WE HANDLE

There is a wide variety of handling operations and equipment in the Exide plant. Materials move in batches through seven main processes, generally all on one floor. Each production lot (or batch) makes numerous stops along the way for quality checks. Many specialized processes are involved in our handling system.

We have more than 100 pieces of materials handling equipment. They include fork lift trucks of 2000- to 6000-lb. capacities, rider-type platform trucks, and electric-powered hand pallet trucks.

Despite the varieties in equipment our studies of truck travel and operational time showed us that time standards for 4000-lb. fork trucks could be used for all sizes of lift trucks, with little or no error.

We used a FACTORY article ("How to Measure Fork Truck Performance," April 1954) as a cross-check and guide for our independent time studies. This material —which proved extremely helpful in preparing to put Exide's trucking operations on direct incentive—gave basic data on fork truck operational elements. The study's analysis was highly useful in figuring various delay and operational factors in trucking operations.

After clearing the way for incentives with plant supervision and the union, we measured the various handling tasks, standardized our methods, and developed standard data from which allowed times were set, all in a conventional manner.

HOW WE SET STANDARDS

The standard data sheet (page 193) shows a list of the standard elements used to make up a rate. Each standard includes a schematic map of the shortest possible route.

Turn the page

REPORTS *on concrete bonding with* THIOKOL *LP/Epoxy compounds*

TEST OF STRENGTH. Concrete beam broken in flexure was then cemented together with a Thiokol LP/epoxy adhesive. Broken a second time, beam failed at point other than the adhesive line. Adhesive stands up though concrete gives way.

#1 *Repairing concrete with adhesives that cure* STRONGER THAN CONCRETE

Through extensive laboratory and field tests, concrete adhesives based on THIOKOL liquid polymers have shown outstanding strength in a wide variety of applications . . . bonding both old-to-old and new-to-old concrete.

They have successfully met the challenge of time, temperature and wear in repairing spalled and scaled areas, broken slabs and cracks . . . in securing cement overlays . . . in skidproofing and sealing . . . and in bonding traffic markers to both cement and bituminous concrete surfaces.

State, municipal and private groups have found in THIOKOL LP/epoxy adhesives a satisfactory solution to many problems of maintenance and repair of highways, buildings, sidewalks, floors. Chances are, you will, too.

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CHEMICAL CORPORATION

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Gentlemen: Please send me available data on THIOKOL LP/Epoxy adhesives for concrete repair.

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SERVIS RECORDERS
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SAVED $40,000
A YEAR

EVERYBODY
was happy!

WORKERS no longer complained about discrepancies in pay checks—they knew the Servis Recorder work-record was right!

OTHER OPERATING DEPTS. and even the training school received several of the lift trucks no longer needed on their previous assignments due to the new efficiency!

THE DEPT. SUPERVISOR received a cash award for efficiency!

MANAGEMENT . . . well, $40,000 savings ain't hay! Management thinks Servis Recorders are wonderful—in fact they have bought 30 more! (Name of this company furnished on request.)

AND you?

You can profit, too, with Servis Recorders. Attach them to any equipment that moves including production machinery, lift trucks, switch engines, company cars or trucks. They record charts showing operating time and idle time of all equipment. With these records you can declare war on inefficiency!

Write for illustrated literature.

THE SERVICE RECORDER COMPANY
1013C ROCKWELL AVE., CLEVELAND 14, OHIO

HANDLING INCENTIVE

Begins on page 192

It was found that an allowance of 10% for traffic obstructions was necessary to cover local average conditions in moving aside interfering materials, skids, and pallets to get at the load. The Yale & Towne-University of Pennsylvania standard data of 27 elements were consolidated into 12 elements.

Truck travel time is figured at 5 miles per hour empty and 4 miles per hour loaded. Standards allow for a full stop before going through a doorway.

HONOR SYSTEM AT WORK

It's at this point that the honor system comes in. Each man in the group of about 30 is given a tally sheet at the beginning of each day, something like the lubrication checklist used at a gas station. This contains a list of all the operations the man is likely to perform—and he simply pencil-checks each operation as he does it (see tally sheet, page 193).

At the end of the day or shift, the man gives his filled-in tally sheet to the timekeeper. The factory supervisor for the area where the man works reviews the tally sheet for general correctness. Simple departmental activity indexes, provided by the industrial engineering department, help the supervisor to judge the tally's legitimacy. These activity indexes relate the amount of materials handling to production levels in his department.

As a further cross-check on the efficiency of the operation, each truck carries a Servis recorder. This three-day clock indicates the minute-by-minute history of the truck's activity.

In case he has waiting time, the truck operator or materials handler checks in immediately with the dispatcher or supervisor to get credit for standby time.

There was considerable debate before the honor system was adopted. Some felt that the men were being handed an overpowering temptation to overmark the sheets. These fears, by and large, have proved groundless. With a reasonable amount of administration, we've found our honor system does work. **END**

FREE NEW Quick Reference CATALOG F-10R

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Industrial Sales Division OPW Corp.
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Circle 565 on Reader Service Card

Learn how you can load a hand cleaner dispenser in less than one minute

SEE PAGE . . . 230

Pittsburgh Superfine is quickly cut to correct size with a knife. Cut sections are then bonded to duct with adhesive. Extra adhesive is applied to edges of insulation to adhere them to edges of metal.

"We used one-inch, 1½-lb. density Pittsburgh Superfine Fiber Glass Insulation with a Neoprene coating to line all ducts," says Mr. George P. Fenton. "Superfine is flexible, adaptable and easy to handle."

At Greater Pittsburgh Airport's New Extension— Pittsburgh Superfine Insulates Air Conditioning Duct Work

"When our company installed the sheet metal ducts for the two air conditioning systems at Greater Pittsburgh Airport's new East Dock, we used over 7,000 sq. ft. of Pittsburgh Superfine Fiber Glass Insulation as the acoustical and thermal lining for the ducts," reports Mr. George P. Fenton, General Manager, McIlroy Sheet Metal Engineers and Fabricators, Pittsburgh, Pennsylvania.

Why Pittsburgh Superfine was specified

"This job called for an insulation that could withstand air velocities, would have proven erosion resistance, would provide good acoustical properties at minimum cost, and would insure resistance against temperature differential. Pittsburgh Superfine met all these requirements easily."

Easy to work with on the job

"We've used Pittsburgh Superfine often, and know from experience that it's flexible, adaptable, easy to handle and easy to cut. It's especially adaptable for use in irregularly curved ducts. There was not a single installation problem on the airport job that we could not handle with Superfine," concluded Mr. Fenton.

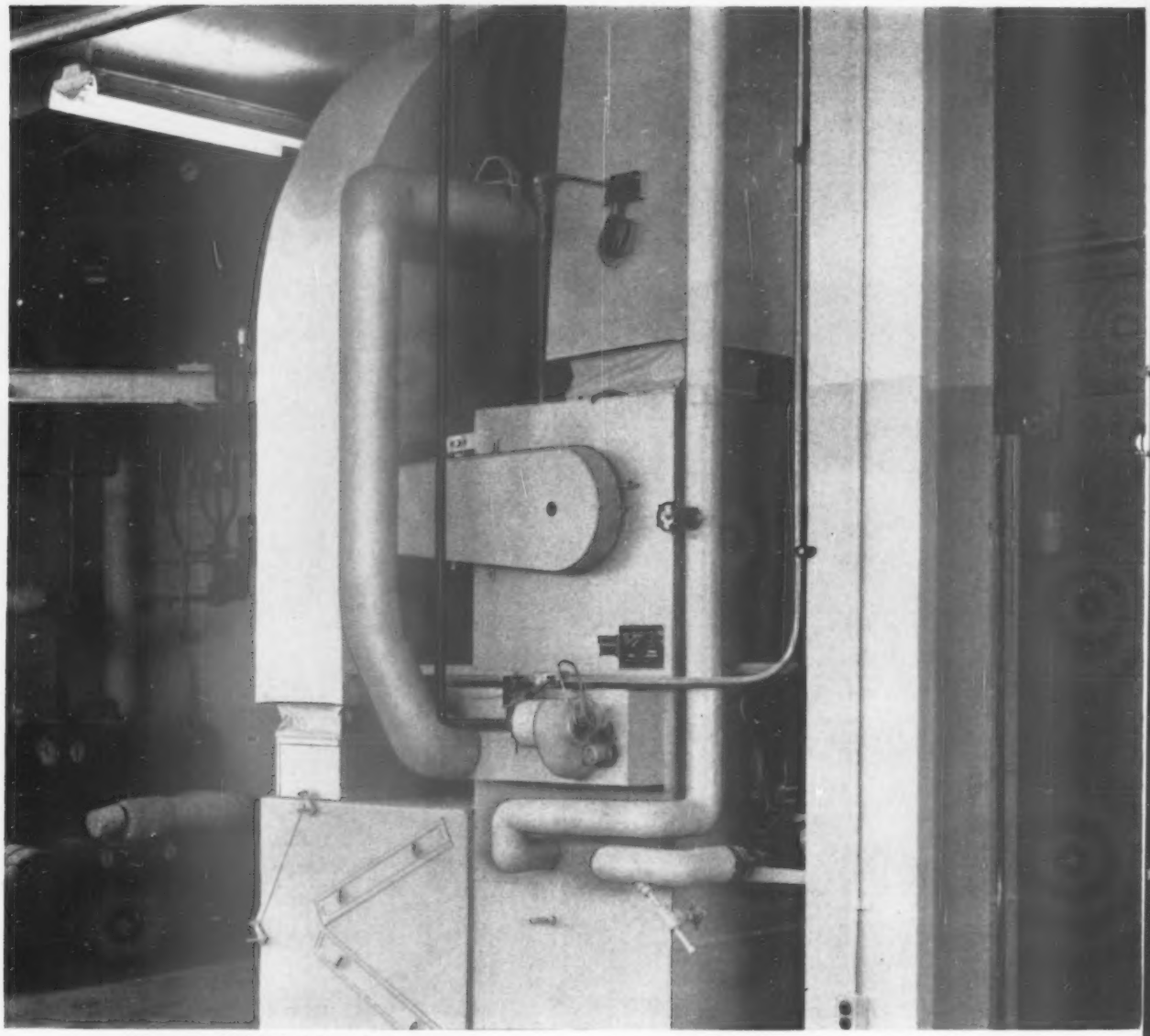
Pittsburgh Superfine Fiber Glass can help you, too!

It's rot proof, fire-resistant . . . and it's the finest insulation against heat, cold or noise you can get! Available in a variety of facings to meet your needs. For complete information, write to *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pa.*

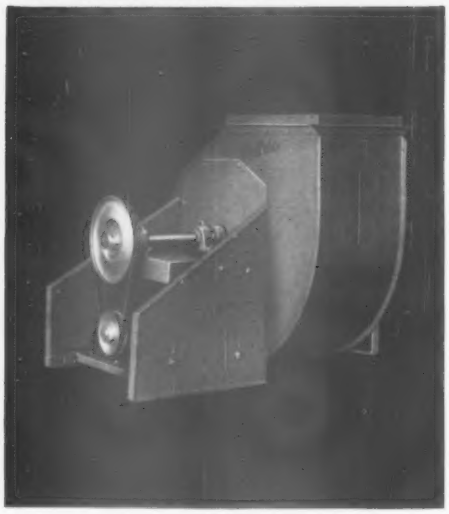
PITTSBURGH SUPERFINE IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, Minneapolis, New York, Philadelphia, Pittsburgh and St. Louis

FIBER PG GLASS PITTSBURGH PLATE GLASS COMPANY



Above: "Buffalo" Central System Air Conditioning Cabinet



Below: "Buffalo" Belted Vent Sets

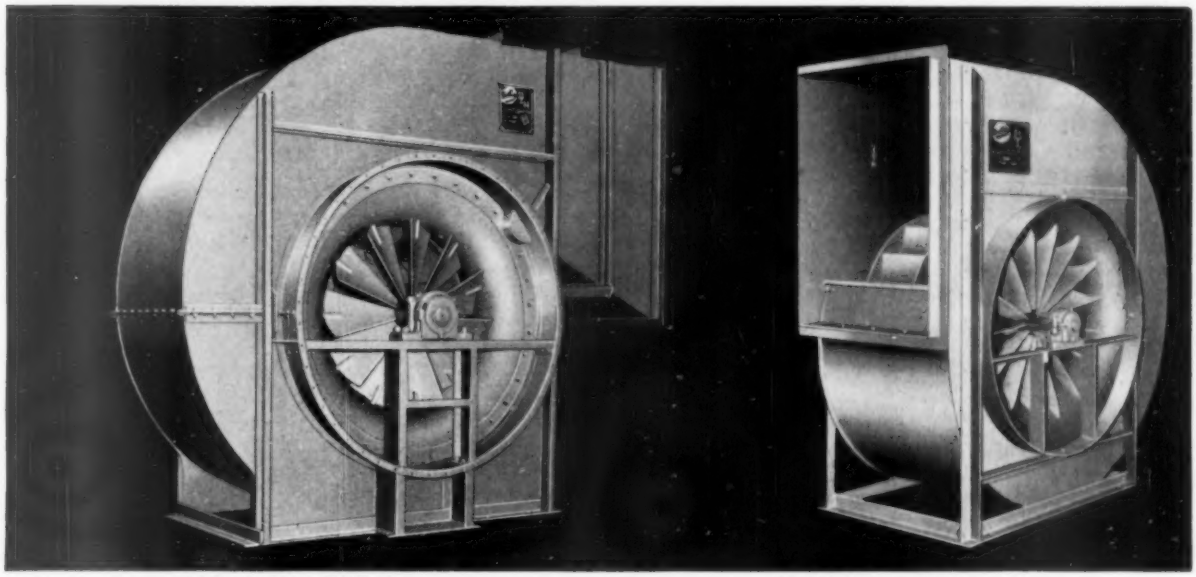
IMPROVED PRODUCTIVITY

THROUGH MORE EFFICIENT USE OF YOUR PLANT AIR WITH "BUFFALO" FANS

Need fans for small, independent systems? For larger systems with variable requirements? For separate systems in different parts of your plant? Then "Buffalo" Belted Vent Sets are your low-cost answer. These quiet, compact, lightweight "packages" are easy to install. Can be used indoors or outdoors; as multiple units, or installed separately to increase your present ventilating facilities. Capacity can be quickly changed to meet future requirements. Available in capacities from 500 to 20,000 CFM. Write for Bulletin 3720-A.

You're assured of optimum performance in Classes III and IV service by the "Buffalo" Type "BLH" Fan. The "BLH" delivers extremely high mechanical efficiencies over a very broad operating range with a peak efficiency of 86%. Ultra-quiet operation and a minimum of turbulence are provided by the smooth inlet bell, matching shroud, directional inlet vanes and non-overloading backward curved blades. The divergent outlet of the "BLH" results in improved pressure distribution at the outlet. Write for Bulletin F-201.

For applications in Classes I and II, the leading choice is the "Buffalo" Type "BL" Fan. It combines non-overloading characteristics with quiet, stable output from free delivery to shutoff. Minimum turbulence is afforded by the smoothly-curved inlet bell with directional guide vanes and matching shroud. Backward curved blades provide peak efficiency. Wheels are factory tested and balanced to achieve performance that is almost vibration-free. Smoothest possible air flow is further enhanced by the carefully-shaped scroll of the wheel-suited housing. Write for Bulletin F-104.



"Buffalo" Type "BLH" Fans
Capacities range from 4,000 to 500,000 CFM

"Buffalo" Type "BL" Fans
Capacities: 600 to 500,000 CFM

Your plant air can be a profitable asset or a costly liability — depending on how you use it. Improved ventilation, heating and cooling can build morale, reduce absenteeism and boost production through increased output per worker. Certain manufacturing operations may require process air conditioning for accurate control of temperature, humidity and dust-free conditions. It will pay you to re-evaluate your present ventilation and/or air conditioning facilities in terms of modern efficiency.

Perhaps you're thinking of modernizing. If your fans are 15-20 years old or more, installation of new "Buffalo" Fans may bring you a welcome increase in the efficiency of your air moving equipment, reducing fan operating costs.

Or perhaps you're thinking of installing a new system. Then you will most certainly be interested in what "Buffalo" equipment can do for your installation. There is a "Buffalo" Fan to suit your every air moving need. And the "Buffalo" reputation for peak performance, economy, dependability and a long life of maintenance-free operation is well-known to plant engineers throughout the world.

Fill your needs from the complete "Buffalo" line — backed by more than 80 years of engineering experience. Your nearby "Buffalo" engineering representative will be glad to assist. Call on him for complete information, or write us direct.

"Buffalo" Fans bring you the "Q" Factor — the built-in QUALITY that provides trouble-free satisfaction and long life.

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VENTILATING • AIR CLEANING • AIR TEMPERING • INDUCED DRAFT • EXHAUSTING • FORCED DRAFT • COOLING • HEATING • PRESSURE BLOWING

By PAUL A. KING, Attorney, Bigelow-Sanford Carpet Company, Inc.; Member, New York Bar

Fees and Dues Make the News

Money paid to unions by employees can be management's business. Especially when workers wind up jobless as a result. Read these three cases.

Case 1. An employee was fired at union request. Reason: He refused to pay a fine for missing union meetings. The NLRB said, "give him back pay."

To encourage attendance at meetings the union fined absent employees. One absent and fined employee was laid off. Under standard union practice laid-off employees in good standing need not pay dues. The union said he was not in good standing. When he returned to work, he was asked to pony-up missed dues payments. He refused and was fired by the company—National Automotive Fibres, Inc. (Oakland, Calif.)—at the union's request.

The NLRB ruled that dues must "be charged to all members alike or that any distinctions be based upon reasonable general classifications. . . . A classification . . . based upon failure to pay fines is not a reasonable classification." The Board found company and union guilty of an unfair labor practice. Ordered them, jointly and severally, to give the employee back pay.

Case 2. The NLRB ordered the company and the union to return an employee's union initiation fees and dues. Reason: His discharge had been based on an illegal hiring-hall clause.

The union contract negotiated by a Teamster Union local and the Los Angeles-Seattle Motor Express Company set forth this procedure for hiring casual workers: "The employer shall first call the union or the dispatching hall designated by the union for casual help. In the event the employer is not notified that such help is not available or in the event the employees called for do not appear for work at the time designated by the employer, the employer may hire from any other available source."

This worker, armed with a letter signed by a union officer saying he could work in the freight industry without going through the union hall, applied for a job—and got it as a casual worker. The company got the idea that the union had waived the casual-employee hiring-hall clause. The union got sore when it found out about it. Demanded that he be fired as a casual worker unless he subjected himself to the hiring-hall procedure. The company fired the employee until he could clear up the matter. And he did so, very effectively, by going to the NLRB.

This hiring-hall clause is illegal, ruled the Board. Doesn't provide these specifics:

1. Selection of applicants for referral to jobs shall be on a non-discriminatory basis.
2. Selection of applicants shall not be based on or in any way affected by union membership, by-laws, rules, regulations, constitutional provisions or any other aspect or obligation of union membership, policies, or requirements.
3. Employer has the right to reject an applicant.
4. The parties shall post notices as to the hiring arrangements and the NLRB safeguards.

Case 3. In an animated hearing before an NLRB trial examiner, The Animated Film Producers Association succeeded in establishing that a $250 initiation fee was excessive.

The NLRB upheld its trial examiner. Concluded that the union's purpose in jacking up initiation fees from $50 to $250 was to discourage job applicants and thus effect a closed shop. The starting pay for animators was $50 per week. A great many came from high schools and art schools and the turnover was great. And $250 was a lot of dough for such a person to plunk down as the price of a job. Return all initiation fees in excess of $50, ruled the Board.

Older Workers Perform Well

Compulsory retirement is costing industry money in terms of lost trained workers.

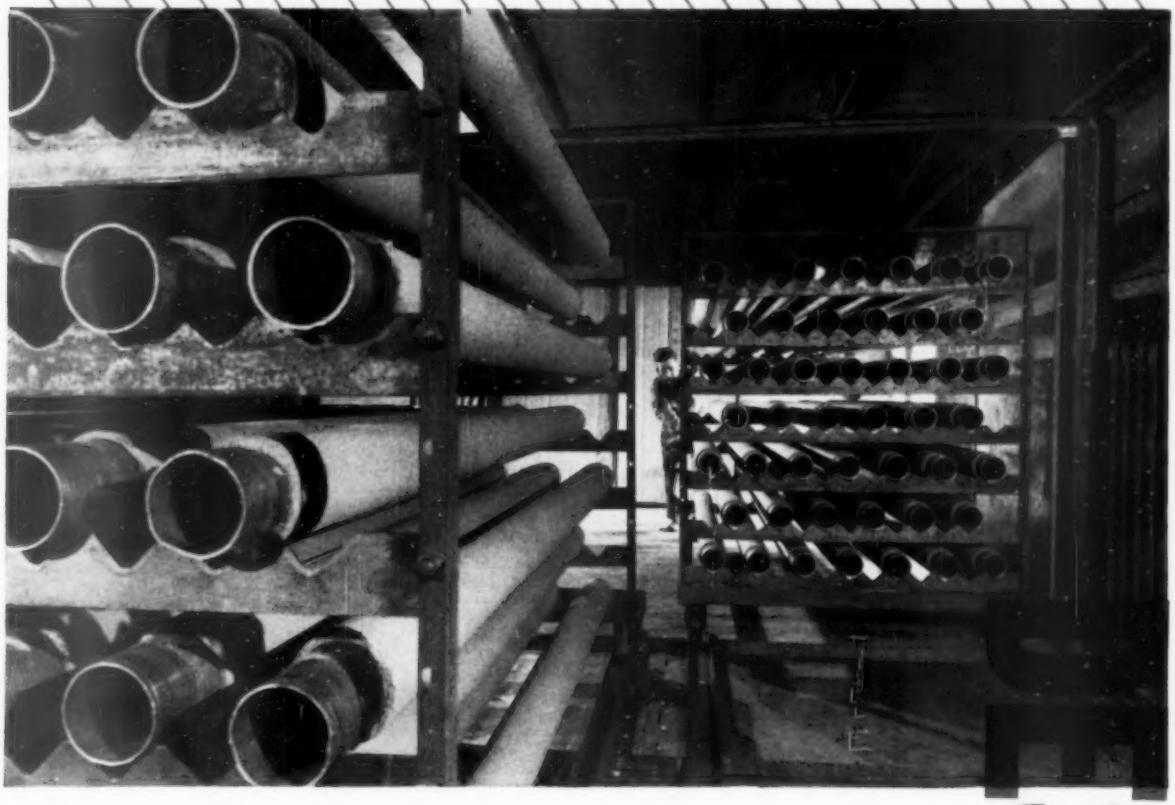
Who says? Ewan Clague, Commissioner of Labor Statistics, made the statement in a talk before the Municipal Finance Officers Association. And he backed up his opinion with BLS figures showing that in recently surveyed footwear and furniture plants there was only a small decrease in productivity as employees became older. The important variations in productivity were not related to age.

Pension Trust Payment

Companies that are short of cash and facing a whacking contribution to a qualified pension trust can satisfy this obligation by a lease-back arrangement and at the same time capture other advantages.

Here's how it works: Your company transfers to the trust the land on which one of its buildings stands. The price of the land will satisfy your contribution to the trust in that amount. You lease the property back from the trust for 20 years (longer if you wish) with an option to buy it back any time at a given price. As annual rent you pay the trust a percentage of this amount—

paper pulp to pipe . . . through HEAT



Hess-Snyder's new Despatch Drying Oven bakes paper pulp pipes to astounding hardness

Need an underground pipe? Hess-Snyder Company, Massillon, Ohio, will make it for you . . . out of cellulose fibre and pitch.

It's called Bituminous Fibre Pipe . . . and it's amazingly hard. It's root proof, is only 1/6 the weight of cast iron, is easy to install and can be sawed to any length right on the job.

What's the secret? The answer is cellulose wood fibre formed into a tube in a huge new Despatch batch type convection oven. Impregnation with coal tar pitch completes the operation.

When the wet tubes come off the rolling mill, they are loaded onto carts and wheeled into the oven, where they dry from 18 to 36 hours. The oven must dry the tubes slowly and *exactly* or water is trapped inside the hard crust where it later causes "splits." The new Despatch oven solves this problem.

Mr. Norman J. Gaynor, Vice President of Hess-Snyder says: "We chose the competitively-priced Despatch Oven because of its proven ability to adhere to close heat tolerances. The oven also operates efficiently under intermittent interruption, that is, changing the size of tube to be dried from day to day. Then, too, we were given tremendous installation assistance by Despatch, who assigned an engineer to work with us for 3 full weeks." Here is another example of Despatch's leadership in the heat processing industry. For *any* heat problem, large or small, you can trust Despatch's unmatched experience—50 years and more than 50,000 installations.

For information, write or call:

DESPATCH OVEN COMPANY
619 S.E. 8th St., Minneapolis 14, Minn., Dept. 72I

DESPATCH OVEN CO.

DESPATCH

say 6%. The Tax Court just okayed this type of plan. It permitted the company to take a deduction in the year of transfer of 10% of its past service costs. This amounted to $73,000 as compared to $389,000—which was the price of the property.

This plan gives you working capital, permits you to deduct the rent from gross income, avoids the strings tied on you when you borrow the usual way. Check this plan with your lawyer.

Superseniority for Non-Strikers?

In labor relations law it is often your motive that may hang you. And that's how this employer, who gave superseniority to non-strikers, was hanged by the NLRB.

Our starting point is the National Labor Relations Act which prohibits an employer from discouraging membership in a labor union by discriminating in tenure of employment. From there we go to a strike situation where the employer, instead of folding up, tries to keep operations going. To do so, he hires replacements for the strikers. To secure replacements he is compelled to tell them they won't be fired when the strike is over. And when the strike is over he sets up a policy of giving replacement workers superseniority. All of this was held to be perfectly legal.

But the California Date Growers Association gave its strike replacements superseniority and thought all should be well under the NLRA. But it wasn't so. The NLRB said in its ruling that it's "motive" that counts. The motive of the Date Growers was to *punish* the strikers. In those instances where the company got away with superseniority for non-strikers, the motive was *protection of non-strikers.* How could the Board tell? In the protection cases the company made its position as to superseniority and protection of tenure for non-strikers clear and open *before* the termination of the strike. The Date Growers' superseniority policy wasn't announced until long after the strike was over. Further, the Board found no evidence of there being any need to promise the Date Growers' replacement employees superseniority in order to continue operations.

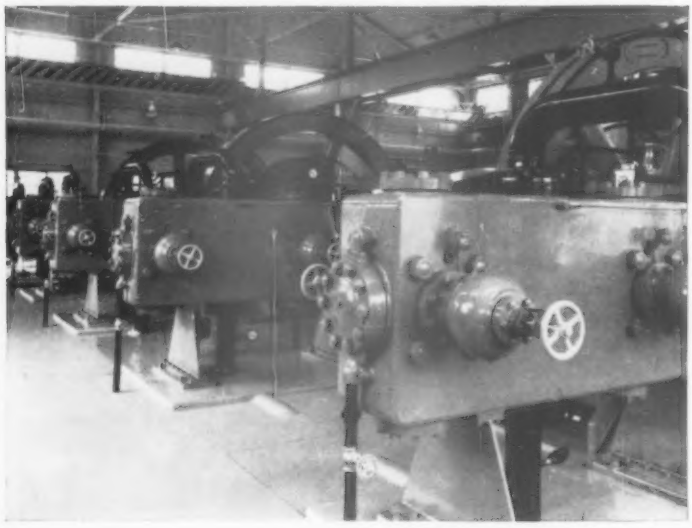
Asleep on the Job

In case you haven't heard, there are two kinds of sleeping on the job—accidental and intentional. One carries a more severe penalty.

A paint shop employee with 15 years of service found a secluded spot and promptly went to sleep. The company wanted to fire him, but the union prevailed upon it to suspend him for a week with a warn-

Quick Case History—reading time 39 seconds

How Hagan CS Inhibitor keeps compressors corrosion-free at UNITED FUEL GAS COMPANY



THE PLANT: Major gas company uses 1000-hp compressors to maintain high gas pressure for transmission. Eight compressor stations are involved throughout West Virginia.

THE PROBLEM: Compressor cooling water is in closed system utilizing fin fans for temperature drop. Pipes became severely corroded due to oxygen attack. At one compressor station, for example, this corrosion caused failure of 2″ black iron piping on discharge side of horizontal compressors.

THE SOLUTION: Hagan CS Inhibitor is now being used in a number of compressor cooling systems. Since introduction of CS Inhibitor, no maintenance or replacement of treated system has been necessary except to repair damage which accrued before treatment was started. Cooling systems have no present problem with corrosion.

TEST RESULTS: Recent 90-day test run on 2 cycle vertical compressor engines showed a corrosion rate (mg/dm²/day) of 0.02 for steel, 0.01 for copper. Other tests taken at the other installations have shown similar results.

GET FULL INFORMATION on how your equipment can give longer life with less maintenance and more effective operation by using Hagan CS Corrosion Inhibitor in its closed water system. Write for Bulletin No. 410-12-3.

HAGAN CHEMICALS & CONTROLS, INC.

HAGAN BUILDING, PITTSBURGH 30, PENNSYLVANIA
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5696

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For more facts Circle 571 on Reader Service Card

ing that next time he'd be sacked. The next time occurred—the employee fell asleep during lunch hour and overslept into his work period. He was fired.

The arbitrator ordered him reinstated, substituted a 5-month suspension. He distinguished between the first sleeping which he said was intentional and the second, which was accidental. The accidental sleep was not a repetition of the intentional sleep. Therefore the employer's threat of discharge for the second offense did not hold up.

Pension Plan Changes

The letter of approval you received from the Revenue Service when you first set up your pension or profit-sharing plan could offer a waterproof umbrella of protection if you have changed your plan since then.

A recent decision of the U. S. Court of Appeals for the 9th Circuit says that once such a letter of approval is given, the tax collectors can't take it back for *comparatively minor* deviations in operation.

After one company set up its profit-sharing plan, it secured an approval letter from the Service. Then it deviated from the plan in four ways:

1. It contributed non-interest bearing demand notes for two years, later substituted back-dated cumulative preferred stock. Plan as set up required contributions in cash or cumulative preferred stock.

2. The management-selected trustees failed to keep books for two years. Didn't make payments to terminated employees until a year after they were due.

3. In fact, no distributions at all were made to employees until 60 days before a tax court hearing.

4. Company held on to money paid to it by the trust for stock because the stock was not available.

The commissioner ruled that the plan hadn't been run for the exclusive benefit of the employees, took back his favorable ruling and stated that certain contributions to the plan were not deductible. The Tax Court stood behind him. But the Circuit Court of Appeals did not—it didn't consider the variations to be of great consequence. The company didn't gain much by them, nor did the employees lose much. Furthermore, the Circuit Court decided that if it agreed with the Commissioner that the plan was disqualified, the trust beneficiaries would suffer.

Proving Union Rights Waiver

You can change wage rates or working conditions without notice to the union if notice is waived by the union. But the employer has the tough burden of showing that, clearly and unmistakably, there was a waiver.

The Beacon Piece Dyeing and Finishing Company of Beacon, N. Y., didn't sustain the burden, said the NLRB. The union's dropping of a workload demand for inclusion in the union contract was not a waiver. It was the usual trading of one demand for another concession.

Nor did the Press Company of Albany, N. Y., when

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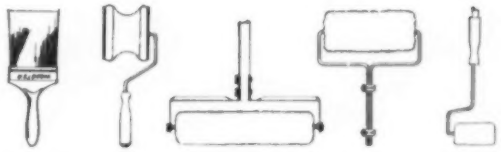
Wooster's rugged aluminum frame is lighter in weight . . . less tiring. Perfect professional tool for steady, all-day use. Try it and you'll discover a few ounces really make a **big** difference.

But the benefits of this well designed tool only begin there. Nylon-to-nylon end caps and bearings roll smoothly. Covers are removed and replaced quickly, with an easy push—won't freeze on frame.

Handle and frame wipe clean with a solvent dampened cloth. Sliding end caps rinse clean in just 2 inches of cleaner. Hand grip is threaded for standard extension handle.

Try Wooster "PRO" FRAMES on your next job . . . choose Wooster surface-matched covers, too. They paint faster, easier, more perfectly. They're guaranteed for use with any paint, in any cleaner.

And be sure to ask your Wooster distributor about these other time-saving maintenance tools.



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WOOSTER, OHIO

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For more facts Circle 573 on Reader Service Card

Begins on page 200

it discontinued commission rates of employees on the theory that it had the right to do so because the subject was discussed at contract negotiations and dropped when the company insisted that the matter was a management prerogative. Giving up union demands for concessions is part of the negotiating game and doesn't necessarily constitute a waiver, affirmed the NLRB.

Employee Witnesses Won't Talk

Employers would win more arbitration awards if employee witnesses could be persuaded to tell the truth. This NLRB decision which convicted a union of an unfair labor practice may have some persuasive value.

The union contract contained a union shop clause. An employee was fired after an argument with the plant superintendent. Three employees who saw the whole thing were asked to sign the superintendent's statement of what happened and testify at the grievance hearing. *But the union agent threatened to take action if they signed the statement. Thereafter they were reluctant to tell all.*

In the Board's opinion there was an implied threat of loss of jobs—because of the union shop (even though, under the law, employees could not be fired for this reason). The union committed an unfair labor practice, ruled the Board.

* * *

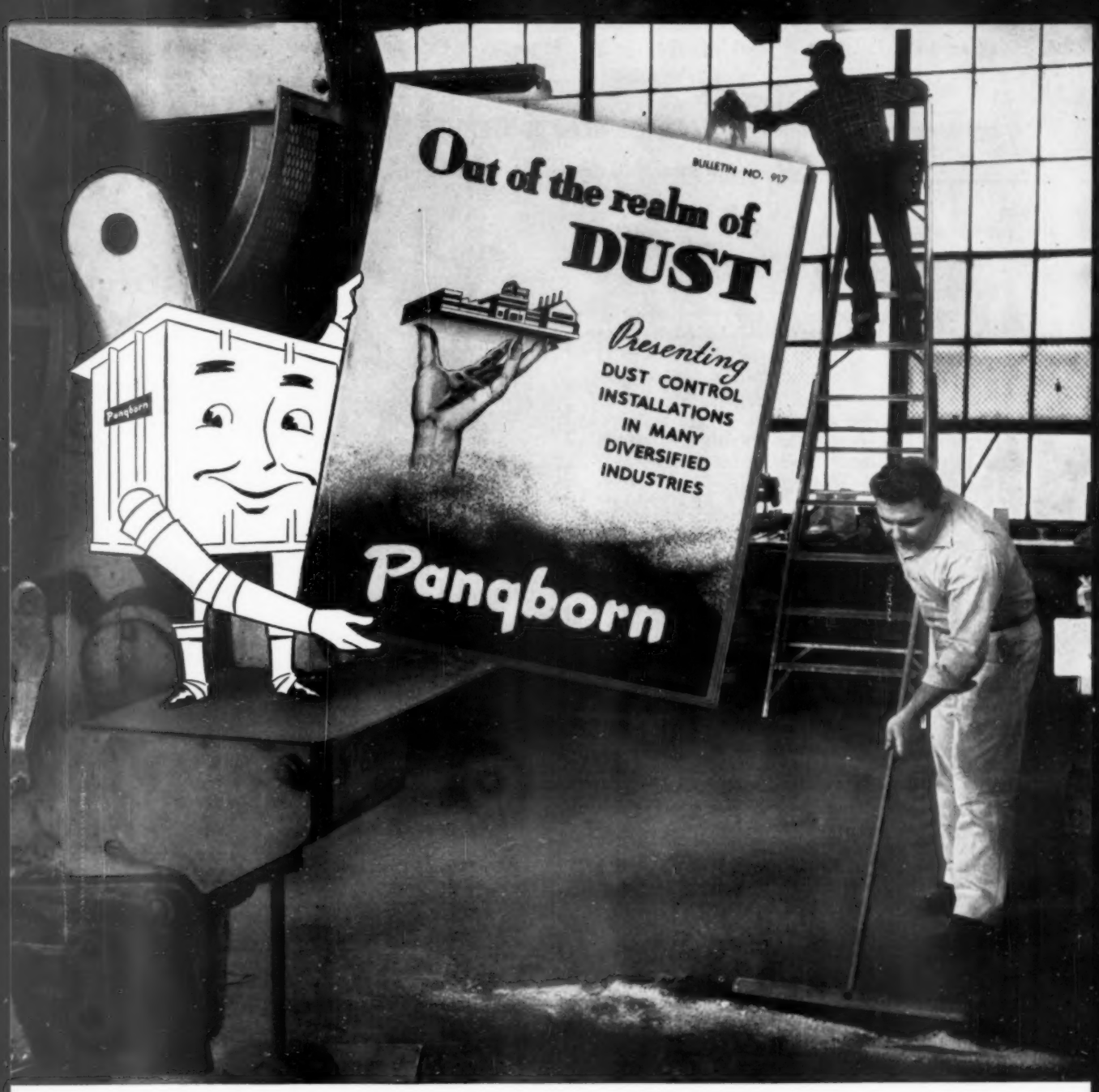
Child labor laws. Do you know the laws that regulate your hiring and handling of children? Who children are, what jobs they can't do, what paperwork is required in hiring them, and dozens of other related questions are answered in Child Labor Bulletin No. 101, revised September 1958, and available from the U. S. Government Printing Office, Washington 25, D. C.

Overtime hours. Better keep good records of overtime hours worked by employees. If you don't, one of your employees is apt to do so. Moreover, he might take you to court to recover overtime pay. And if he does, says the Minnesota Supreme Court, his record is admissible.

What's a bargaining unit? At Westinghouse Air Brake, design, test, staff and junior engineers, and chemists comprise a professional bargaining unit, ruled the NLRB. Excluded from such a group are sales, equipment planning, plant and tool standards engineers, patent attorneys, technical writers, foundry metallurgists, and layout designers.

Unemployment Insurance and SUB. Labor relations attorneys or legal-minded employers who seek a basis in the law for integration of Unemployment Insurance with private SUB plans are scheduled for failure. The decisions are political, state the authors of an article on this subject in the October issue of the *Industrial and Labor Relations Review* put out by Cornell University. Of 39 rulings, 30 were handed down by elected officials, according to the article.

For more facts Circle 574 on Reader Service Card ➤



Lower housekeeping costs? Pangborn Dust Control! Here's why!

Yes, this fascinating booklet *tells* you why. It tells you what Pangborn Dust Collectors have done for many different companies in many different fields. How they have cut plant housekeeping costs for these firms . . . lengthened machinery life, improved employee efficiency and morale, reclaimed material for salvage. How Pangborn can give *you* these benefits.

Why Pangborn Dust Control? Because Pangborn offers the most efficient methods of dust collection on the market. Pangborn has spent 50 years dealing with dust problems . . . experience that is incorporated in every proposal. And Pangborn's extensive line of wet and dry collectors means that one of these units can be adapted with maximum effectiveness to *any* problem.

Send for your copy of "Out of the Realm of Dust." And remember: the Pangborn Engineer in your area will be glad to take off his jacket and go to work on your dust problem at no obligation. PANGBORN CORP., *2100 Pangborn Blvd., Hagerstown, Md. Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn CONTROLS **DUST**

HUMAN RELATIONS

By GEORGE A. HOY, JR., Industrial Management Editor, FACTORY

CURE FOR POOR WORK:
Save the Sweet Talk

Too much "human relations" has come between us and our ability to get a job done. That's the core of an article in *Look* for Oct. 28, 1958, by Prof. Malcolm P. McNair of Harvard Business School.

To quote McNair:

"We think less about how to do a good job than about how to be a good guy.

"A boss needs to see that an employee does a good, honest day's work. The boss should be able, if necessary, to bring a worker up to that standard without any concern as to whether his childhood was unhappy or he is having trouble with his wife.

"The . . . evil in the 'human relations' fad is its repeated violation of the dignity of the individual. It becomes a technique for manipulating people . . . analyzing motives . . . judging lives.

"Unless we can restore our toughness and our ability to get a job done, while sustaining human dignity, time will run out on us. We have to learn to be not only kindhearted but hardhearted."

Bravo, Professor! It needed saying.

CURE FOR ABSENCE:
Spread the Responsibility

"John Doe won't be in," says the voice from the personnel department. "His wife just called to say he's sick." Every supervisor knows there's a good chance that John isn't sick. But that doesn't solve the problem of how to get the work done. Simple fact is, John is needed.

Trouble may be, says the American Medical Association, that John doesn't know he's needed—doesn't feel he has enough responsibility. The AMA *Journal* cites a study that showed that only 35% of employees with more than four absences in a six-month period felt they had enough responsibility in their jobs. Of employees with only one absence in six months (a much better record, you'll agree), 65% felt they had enough responsibility.

There's plenty of room for other absence influences in the statistics, but the feeling of too little responsibility emerges as one cause of your vacant desks and machines. Remember this the next time you install a procedure that calls for "routing everything through this office for approval." You may head off a few mistakes this way, but you may also wind up doing the job yourself because John Doe isn't in.

Plain Talk—Japanese Style

Take a lesson from the man in the kimono. When he really wants to get a message across, he talks a telegraphic language.

Katakana is one of two distinct forms of Japanese speech. Unlike the flowery Japanese speech patterns popularly known to Americans, it is a "square, inelegant but eminently sensible form of syllabary," according to the *History of Japanese Literature*, edited by Donald Keene, Grove Press, New York, 1955.

Once thought improper and crude, Katakana now enjoys popular acceptance. It's used for telegrams and many other communications that call for fast, clear understanding.

What you can learn from Katakana is obvious. Americans go one better. We have not two, but many ways of saying the same thing. You can say, "The combustible materials in this building have reached the kindling point." But if you really want to get action, you yell, "The plant's on fire!" You can say, "We note a difference between your demonstrated capabilities and the expectations established in the job description." But if you really want to make sure you're understood, you say, "Get on the ball, Joe. You've slipped."

Big Money for Suggesters

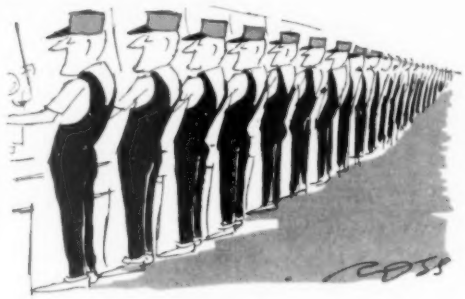
Almost $14-million was paid out in suggestion awards to employees of companies belonging to the National Association of Suggestion Systems, Chicago. The Association's records show that 25% of all employee suggestions submitted were adopted and used.

Could be time for a boost in the promotion of employee suggestions at your plant. One in four of these original ideas will be a winner for you as well as for the employee.

Automated Aladdin

Don't polish the lamp—push the button. And a wonderful plant lunch will appear. That's the prediction for the future made by President Harold Roth of U. S. Hoffman Machinery Corporation, in a speech before the National Automatic Merchandising Association.

Roth predicts the development of central control panels that will accept the employee's money or charge card, remember each item as he punches his appetizer-to-dessert selections. Then the complete meal will appear, genii-like, filling the worker's fondest ingestive dream.



Regimented Thinkers

Got a plant full of conformists? If so, don't expect creative ideas from them. And don't mistake the conformity straitjacket for loyalty. Advice comes from Dorwin Cartwright, University of Michigan Group Dynamics Research Director, speaking to the American Public Health Association. He lists five creativity sicknesses and cures:

1. Underconfident employees—In fostering greater self-confidence the manager strikes a blow for creativity, too. Employees should be helped to feel capable. Mistakes should be criticized privately and constructively. Specializations should be recognized as an asset to the company.

2. Insecure group members—"One of the strongest pressures against being different in a group is fear of rejection. A person who feels 'on trial' . . . seldom feels free to appear unconventional or controversial. An organization whose members do not feel secure in their membership is not likely to generate many creative or original ideas."

3. Uniform background and training—"Originality is more common where people of different background, training, and orientation are thrown together. But the natural tendency is to add new people to a staff who are congenial to the old and who approach problems in a similar way." To prevent the deadening effect of having everyone think alike, select new people who are different.

4. Cloistered loyalties—"The best guarantee that an organization will remain flexible and productive of original ideas is to be sure that its members have outside loyalties—to professional societies, business groups, and the like. Multiple loyalties often create conflicts within an organization and tensions within the individual, but out of such conflicts and tensions new procedures and organizational growth will often develop."

5. Threat to the organization from outside—This will cause conformity. The manager can openly recognize the danger from this source, minimize its effects by concentrating on the other four creativity stiflers listed above.

Seeking Older Workers

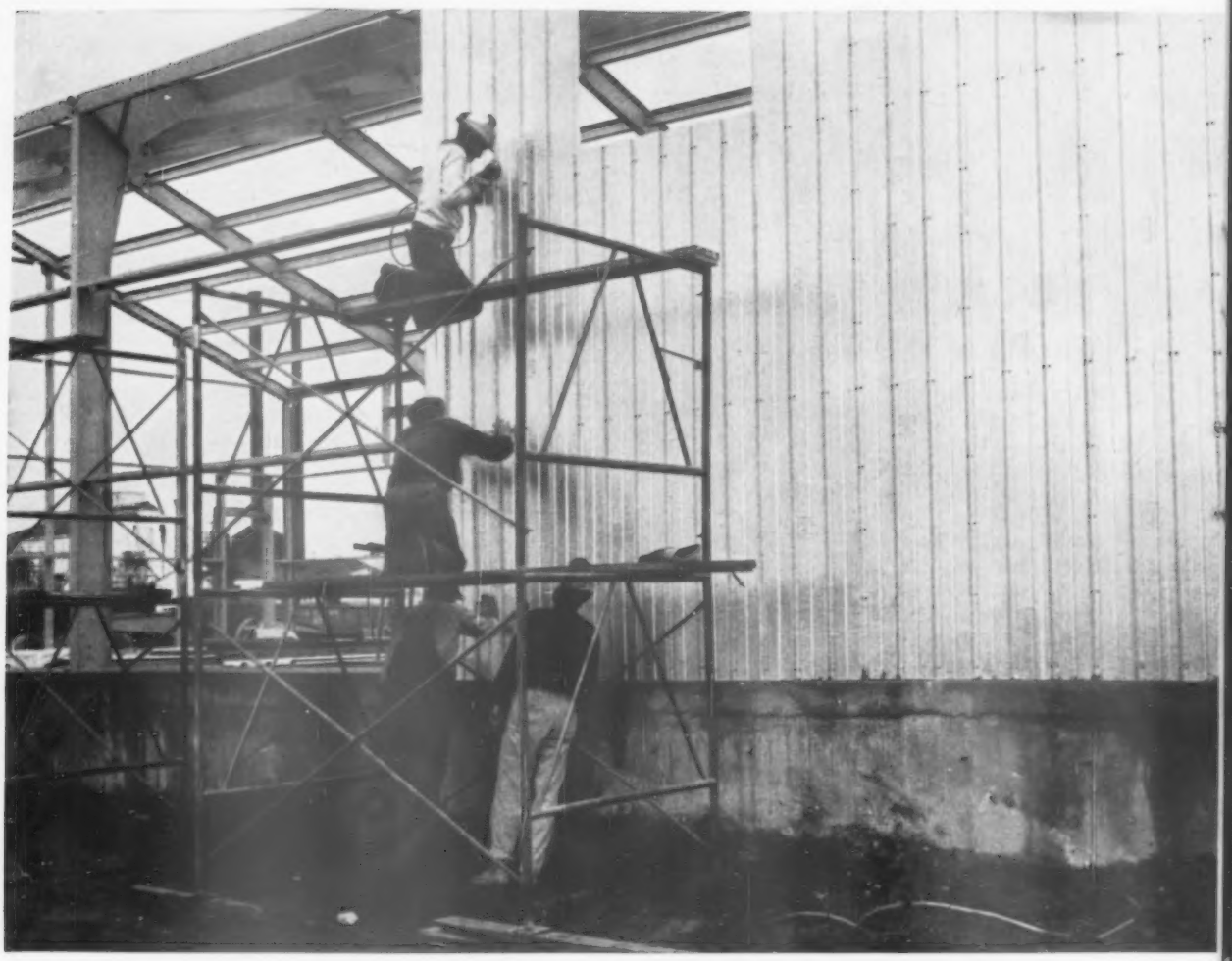
At least one company practices what the fact-finders have been preaching. Clary Corporation (San Gabriel, Calif.) is actively engaged in hiring men over 40. The company has decided they make more permanent employees, require less supervision, and have lived long enough to know that everyone must work hard to make a living.

Makes sense, doesn't it? No doubt you'll agree it does. But are you hiring older workers yourself?

Scholastic Sleuth

College students guard the plant for General Aniline and Film Corporation (Linden, N. J.). They sparkle in their new navy-blue uniforms. They excel in their efficiency and courtesy. Their absenteeism records are a welcome change from the problem that once plagued the force.

Assigned to shifts that fit their scholastic schedules, the students like the job as much as the company likes having them.



3 WEEK DELIVERY

TRUSCON "Budget-Buildings"

Truscon Steel "Budget Buildings" are the fast, economical way to provide warehousing, enlarge manufacturing facilities, erect field offices at lowest cost. Available with 3-week delivery from order to job site!

Basic framework is of rigid frame design, shop fabricated from hot rolled structural sections, complete with all necessary connection plates and anchor bolts. Purlins and girts are cold formed channel sections, bolted with standard machine bolts.

Roofing and siding are 26-gage galvanized roll formed ribbed sheets 24″ wide, and in continuous lengths. Sheets are rolled from Republic tight-coated, continuous hot dip galvanized steel . . . will not flake, crack, or peel. More rust resistant than ever and no painting needed.

Truscon "Budget Buildings" are available in widths of 32, 36, 40, 44, and 48 feet—12- and 14-foot heights, in any lengths necessary. All roofing, siding, windows, doors, and hardware are shipped to the job site as a package.

To learn more, call your Truscon representative, or write for attractive, full-color brochure.

For more facts Circle Reader Service Card numbers as follows:

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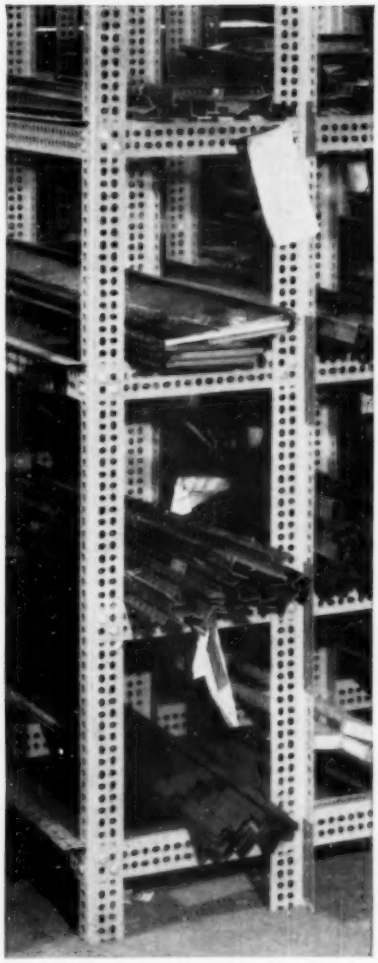

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CHART 1 – How to Recognize Plant Layout and

Indicators of Layout and Related Problems / Possible Causes of Problems		GENERAL						MATERIALS HANDLING									PLANT LAYOUT																
		1. Poor housekeeping	2. Crowded conditions	3. No over-all plan	4. No alternatives	5. Excess mtls. on hand	6. Poor schedule, dispatch	7. Bldg. cube unused	8. Delayed mtl. movement	9. Unsuitable containers	10. Non-use of mech. equip.	11. Manual hndlg., rehndlg.	12. Loads not unitized	13. Long hauls	14. Wrong move, first time	15. Mtls. piled on floor	16. Poor storage equip.	17. Poor flow pattern	18. Unbalanced oprns. seq.	19. No flexibility	20. No space	21. Inadequate equip., fac.	22. Bad space allocation	23. Poor plant layout	24. Poor process methods	25. No aisle markings	26. Poor placing, spacing	27. Poor loc., source or dest.	28. Poor loc. related activ.	29. Employees waiting	30. Material-flow blocks	31. Scattered buildings	32. Rel. areas partitioned	33. Crooked aisles
GENERAL	a. Crowded aisles	✓	✓		✓	✓	✓	✓	✓	✓			✓		✓	✓	✓	✓			✓	✓	✓	✓		✓				✓			✓
	b. Hazardous areas	✓	✓							✓	✓	✓	✓								✓	✓		✓		✓	✓			✓			✓
	c. High accident rate	✓	✓							✓	✓	✓									✓	✓			✓	✓	✓			✓			✓
	d. High overhead	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓			✓	✓	✓	✓	✓
	e. Crowded conditions	✓			✓	✓	✓	✓	✓	✓			✓			✓	✓	✓			✓		✓	✓		✓	✓			✓			✓
	f. Poor housekeeping		✓			✓		✓	✓	✓			✓			✓	✓				✓	✓	✓			✓	✓			✓		✓	✓
PRODUCTION	a. High indir. labor				✓		✓				✓	✓	✓	✓	✓			✓						✓							✓	✓	✓
	b. Unexplainable delays	✓	✓	✓		✓	✓		✓		✓	✓	✓	✓		✓		✓	✓	✓	✓	✓		✓	✓				✓	✓	✓	✓	✓
	c. Scheduling trouble	✓	✓	✓	✓	✓	✓		✓		✓	✓		✓	✓			✓	✓	✓		✓		✓	✓			✓	✓	✓	✓	✓	
	d. High in-process mtl.				✓	✓	✓	✓										✓	✓	✓		✓		✓	✓				✓				
	e. Too many men collecting scrap, waste									✓	✓		✓	✓		✓		✓				✓		✓	✓			✓					
	f. Material-flow blocks	✓	✓		✓	✓		✓	✓	✓	✓			✓		✓		✓			✓		✓	✓			✓			✓	✓	✓	✓
	g. Equipment moved often			✓	✓													✓				✓	✓	✓	✓		✓						
	h. Related work scattered			✓	✓			✓										✓		✓		✓	✓	✓			✓	✓		✓	✓	✓	
	i. Uneven flow rate		✓	✓			✓		✓		✓	✓		✓		✓		✓	✓	✓		✓		✓	✓			✓	✓	✓	✓	✓	✓
	j. Scattered buildings			✓	✓			✓														✓	✓				✓	✓					
	k. Vanishing aisles	✓	✓	✓		✓		✓	✓				✓			✓	✓				✓	✓	✓		✓	✓				✓			✓
	l. Walls, partitions, betw. related areas				✓													✓			✓		✓				✓	✓			✓		
	m. Blocked doorways	✓	✓		✓	✓			✓	✓						✓	✓				✓		✓					✓					
	n. No flexibility	✓	✓	✓	✓			✓	✓	✓								✓			✓	✓	✓	✓						✓	✓	✓	
	o. Makeshifts perpetuated			✓	✓														✓	✓	✓		✓						✓	✓			
	p. Working in aisles		✓	✓	✓	✓		✓										✓			✓		✓	✓		✓	✓			✓		✓	✓
	q. Mtnce. hard to perform	✓	✓	✓			✓									✓						✓		✓		✓					✓		
	r. Mfg. cycle too long	✓	✓			✓	✓		✓			✓				✓		✓	✓		✓		✓	✓						✓		✓	✓
	s. Idle production equip.					✓	✓		✓										✓	✓				✓									
	t. Overloaded prod. equip.				✓	✓	✓											✓	✓		✓			✓									
	u. Low production density	✓	✓	✓	✓	✓	✓		✓		✓	✓						✓	✓	✓	✓	✓		✓	✓					✓	✓		✓
	v. Vacant floor space			✓	✓																✓	✓	✓			✓						
	w. Poor quality	✓	✓	✓							✓	✓		✓		✓	✓				✓			✓									
	x. Line-machine breakdowns			✓	✓		✓											✓		✓	✓			✓									
	y. Inaccessible machines	✓	✓	✓		✓		✓	✓	✓						✓		✓			✓	✓	✓	✓		✓		✓			✓	✓	
	z. Bottleneck operations			✓	✓	✓	✓		✓		✓							✓	✓	✓	✓		✓	✓				✓	✓				
	aa. Crooked aisles		✓	✓	✓			✓								✓	✓	✓			✓	✓	✓		✓	✓							✓
MANPOWER UTILIZATION	a. Too many men moving materials			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓		✓	✓	✓	✓	✓	✓	
	b. Handling by skilled men				✓	✓	✓		✓	✓	✓	✓			✓	✓			✓			✓		✓			✓	✓	✓				
	c. Excess manual handling				✓	✓	✓		✓		✓	✓	✓		✓	✓		✓				✓		✓					✓				
	d. High labor turnover	✓	✓	✓																				✓									
	e. Walking for tools, mtls.				✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	✓		✓	✓	✓	✓	✓	✓	

How to Spot Your Plant Layout

They're sneaky problems. Fact is, you may not even know you've got 'em. But they can strangle your plant operations, choke off your profits. So here's a foolproof guide to the signs and causes of trouble—and the action needed.

By JAMES M. APPLE, Industrial Management Consultant, East Lansing, Mich.

Related Problems – and How to Spot the Causes

Indicators of Layout and Related Problems		GENERAL						MATERIALS HANDLING										PLANT LAYOUT															
	Possible Causes of Problems	1. Poor housekeeping	2. Crowded conditions	3. No over-all plan	4. No alternatives	5. Excess mtls. on hand	6. Poor schedule, dispatch	7. Bldg. cube unused	8. Delayed mtl. movement	9. Unsuitable containers	10. Non-use of mech. equip.	11. Manual hndlg., rehndlg.	12. Loads not unitized	13. Long hauls	14. Wrong move, first time	15. Mtls. piled on floor	16. Poor storage equip.	17. Poor flow pattern	18. Unbalanced oprns. seq.	19. No flexibility	20. No space	21. Inadequate equip., fac.	22. Bad space allocation	23. Poor plant layout	24. Poor process methods	25. No aisle markings	26. Poor placing, spacing	27. Poor loc., source or dest.	28. Poor loc. related activ.	29. Employees waiting	30. Material-flow blocks	31. Scattered buildings	32. Rel. areas partitioned	33. Crooked aisles
MANPOWER UTILIZATION	f. High load, unload time				✓							✓						✓			✓	✓		✓									
	g. Cramped work quarters	✓	✓		✓	✓	✓	✓	✓	✓			✓					✓			✓		✓	✓	✓			✓		✓		✓	✓
	h. Idle personnel				✓		✓		✓		✓							✓	✓			✓		✓	✓				✓				
	i. Awkward work cycle	✓	✓		✓	✓				✓	✓	✓						✓	✓		✓	✓	✓	✓	✓		✓		✓		✓		
	j. Difficult handling	✓	✓							✓	✓	✓	✓	✓	✓	✓		✓			✓			✓	✓		✓	✓	✓	✓	✓	✓	✓
	k. Waiting for mach. cycle				✓														✓		✓				✓			✓					
	l. Waiting for materials				✓		✓		✓	✓	✓		✓	✓	✓			✓	✓						✓			✓		✓	✓		
	m. Waiting for help				✓				✓		✓					✓			✓						✓						✓		
	n. Unsafe conditions	✓	✓		✓							✓									✓	✓									✓		
	o. Operator away from work				✓		✓		✓			✓							✓	✓	✓												
MATERIALS HANDLING	a. Backtracking		✓	✓	✓		✓				✓	✓			✓			✓	✓		✓		✓	✓	✓			✓		✓	✓	✓	✓
	b. Zig-zag flow lines		✓	✓	✓		✓				✓	✓			✓	✓		✓	✓		✓		✓	✓	✓		✓	✓		✓	✓	✓	✓
	c. Traffic jams	✓	✓			✓	✓	✓			✓	✓	✓	✓	✓	✓		✓			✓		✓	✓		✓	✓	✓		✓			✓
	d. Long hauls			✓	✓		✓				✓				✓			✓					✓	✓	✓			✓	✓		✓	✓	
	e. Overloaded hndlg. equip.				✓	✓	✓		✓		✓	✓	✓	✓	✓			✓			✓			✓				✓					
	f. Underloaded hndlg. equip.						✓			✓			✓		✓			✓						✓				✓			✓		✓
	g. Rehndlg. and transfer		✓		✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓			✓	✓		✓		
	h. Two-man hndlg. tasks				✓					✓	✓										✓				✓					✓			
	i. Idle hndlg. equipment	✓	✓				✓	✓			✓					✓	✓			✓			✓					✓					
	j. Manual handling		✓		✓				✓	✓	✓	✓	✓		✓	✓	✓	✓			✓		✓	✓		✓	✓			✓			
	k. Piece-at-a-time hndlg.				✓					✓	✓	✓	✓		✓	✓					✓			✓		✓	✓		✓	✓			✓
	l. Mtls. damaged, pilfered	✓	✓			✓		✓		✓	✓	✓	✓		✓	✓					✓			✓		✓	✓				✓		
	m. Slow mtls. movement	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓			✓		✓	✓	✓		✓	✓	✓	✓
	n. Much hndlg. betw. oprns.		✓			✓					✓				✓	✓	✓	✓			✓			✓			✓	✓		✓	✓	✓	
	o. High equip. mtnce.																																
	p. Obsolete hndlg. equip.			✓							✓																						
RECEIVING, SHIPPING, STORAGE	a. Transfer betw. containers				✓		✓			✓			✓		✓		✓				✓			✓									
	b. Excess temp. storage					✓	✓	✓	✓	✓			✓				✓				✓												✓
	c. Manual loading, hndlg.				✓	✓				✓	✓		✓			✓					✓			✓					✓			
	d. Mtls. piled on floor				✓	✓	✓	✓		✓	✓		✓			✓					✓			✓								
	e. Disorderly storage area		✓	✓		✓	✓	✓	✓	✓			✓			✓	✓				✓	✓	✓		✓				✓			✓
	f. Unused overhead space									✓	✓		✓			✓	✓				✓												
	g. Poor storage equip.																				✓												
	h. Misplaced materials	✓	✓			✓	✓		✓	✓		✓	✓		✓	✓	✓	✓			✓	✓								✓	✓	✓	✓
	i. Waiting carriers						✓		✓	✓	✓	✓	✓	✓							✓	✓			✓			✓	✓	✓	✓		✓
	j. Shipping delays					✓	✓		✓	✓	✓	✓	✓									✓			✓					✓	✓	✓	✓
	k. Demurrage charges					✓	✓	✓	✓	✓	✓		✓				✓				✓	✓											
	l. Unstandardized containers			✓									✓				✓																

Problems—and Find the Answers

SOMEBODY HOLLERS when something goes wrong in most plant activities. Why? Because what's wrong usually affects somebody—and he makes it known he's hurt.

Not so with plant layout. Plant layout is more concerned with things than with people. So when something goes wrong with it, it often happens that nobody squawks—and the problem therefore goes unnoticed and unsolved for too long.

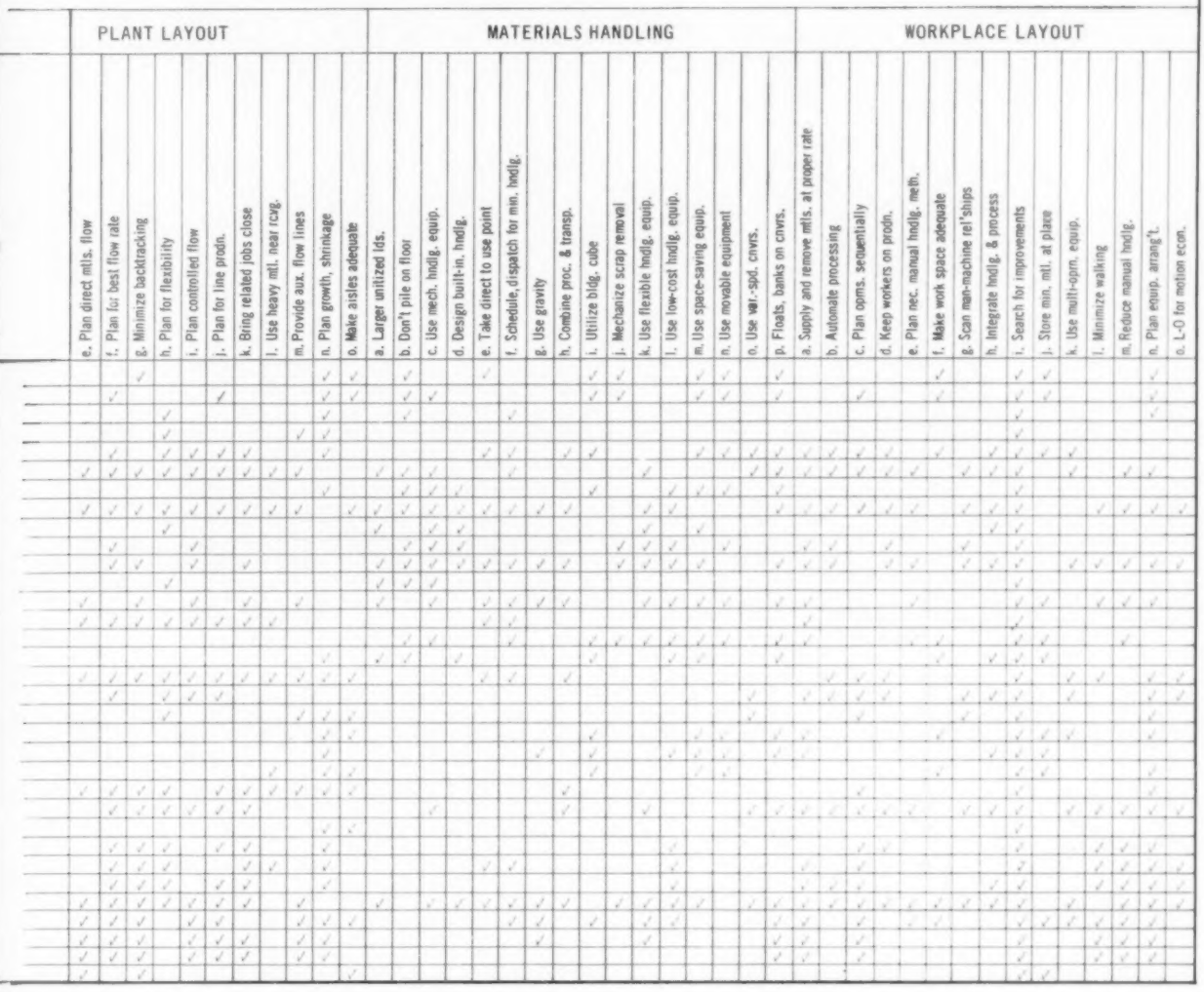
That's just one reason why you should audit your plant layout periodically (charts above and on following pages). Other reasons why problems in layout go unnoticed or unsolved (though they're just as important as problems of finance, materials, and personnel, which most plants audit regularly):

- Layout inefficiencies have a way of creeping in slowly—and compounding gradually. They're usually

CHART 2 – What Causes Plant Layout and

| Possible Problem Causes \ Suggested Problem Answers | | GENERAL | | | | | | | | | | | | | | | | SHIPPING, RECEIVING, STORAGE | | | | | | | | | | | | | | | |

Related Problems – and What to Do About Them


PLANT LAYOUT
MATERIALS HANDLING
WORKPLACE LAYOUT
e. Plan direct mtls. flow
f. Plan for best flow rate
g. Minimize backtracking
h. Plan for flexibility
i. Plan controlled flow
j. Plan for line prodn.
k. Bring related jobs close
l. Use heavy mtl. near rcvg.
m. Provide aux. flow lines
n. Plan growth, shrinkage
o. Make aisles adequate
a. Larger unitized lds.
b. Don't pile on floor
c. Use mech. hndlg. equip.
d. Design built-in. hndlg.
e. Take direct to use point
f. Schedule, dispatch for min. hndlg.
g. Use gravity
h. Combine proc. & transp.
i. Utilize bldg. cube
j. Mechanize scrap removal
k. Use flexible hndlg. equip.
l. Use low-cost hndlg. equip.
m. Use space-saving equip.
n. Use movable equipment
o. Use var.-spd. cnvrs.
p. Floats, banks on cnvrs.
a. Supply and remove mtls. at proper rate
b. Automate processing
c. Plan opns. sequentially
d. Keep workers on prodn.
e. Plan nec. manual hndlg. meth.
f. Make work space adequate
g. Scan man-machine rel'ships
h. Integrate hndlg. & process
i. Search for improvements
j. Store min. mtl. at place
k. Use multi-opn. equip.
l. Minimize walking
m. Reduce manual hndlg.
n. Plan equip. arrang't.
o. L-O for motion econ.

have been creeping into your plant layout"

one for materials handling. Plant layout is also closely related to methods, production control, employee training, and many other phases of plant activity. We can conclude that an efficient layout is the result of skillful integration of many factors that affect the flow of materials through the plant.

With this in mind, let's take a look at some things that keep us from attaining the goals of efficient materials flow and straight-line movement. And let's find them by looking for indicators—or symptoms of difficulties—that may be traceable to inefficient plant layout.

USING THE CHARTS

Chart 1 (p. 212) lists main problem indicators—76 to be exact— to look for in your plant. There could be more of them, peculiar to specific types of business. Chances are, if you find one, you can trace it back to some error or inefficiency in your plant layout.

These indicators can tell you the cause (or causes) of the problem. Across the top of Chart 1 are 33 possibilities—all closely related to plant layout. (There are many more problem causes related to these indicators. But they go beyond plant layout and closely related problems

WORKSHEET FOR SPOTTING AND ANALYZING LAYOUT PROBLEMS

Found in Plant 2 (area) **by** RSR (observer) **date** 11-21-58

1. Indicators (from Chart 1)	2. Possible Causes (from Chart 2)	3. Suggested Solutions (from Chart 2)	4. Responsibility for investigation assigned to: (person or dept.):
J. Scattered buildings	3. Lack of planning	-Change sequence of operations -Devise master plan -Review overall plan -Improve communications	WJK
		-Use containers to consolidate mt'ls. into unit loads -Use standardized containers throughout the cycle	MJM
	4. Lack of alternatives	-Study all layout problems in relation to mtl. handling and vice versa -Construct master layout	
	7. Failure to use building cube	-Plan all changes in accordance with master layout	EWZ
	22. Improper space allocation	-Plan for movement of mtls. in as direct path as possible thru the plant	
	23. Poor plant layout	-Minimize backtracking -Place related activities near each other	
	27. Poor location of source or destination	-Plan for future expansion or contraction -Install mechanical handling equipment -Eliminate unnecessary handling by proper planning, scheduling, dispatching -Combine processing and transportation -Make proper use of building "cube" -Design hdlg. equip. to carry mtl. in a position to save space -Use equip. requiring no fixed floor space -Use of conveyors for floats & banks	MJM
		-Consider relationships with preceding and succeeding operations	... EWZ
		-Study operations for any possible improvement	... WJK
		-Plan proper arrangement of equipment	... MJM

Begins on page 212

and therefore they have been omitted from this article.)

The checkmarks within the chart show the causes of problems for each indicator. If you find a problem indicator in your plant, the problem cause will be one (or a combination) of the causes checked in the chart on the line of that indicator.

Chart 2 (pages 214-15) relates causes to solutions. The checkmarks show the possible solutions for each problem cause.

You can use these two charts as checklists when you audit your plant layout. But you can't use them to make a record. To record your findings and your follow-up, you can copy the form shown above, using a separate form for each plant area or unit that you check. The complete audit will require not only several checksheets, but a detailed consideration of the interrelationships among the various areas. Since many of the problems will cut across department or building lines, the solutions to many of them will demand this integrated approach.

FIVE STEPS FOR AN AUDIT

Here's the best basic procedure you can follow:

1. Systematically review operations in each specific area of activity with the aid of the audit charts. List indicators in column 1 of the record form.

2. Select causes of problems from the top of Chart 1 and list them alongside the entries of indicators (column 2 of the record form). Add other causes or areas you may think of for investigation.

3. From Chart 2 list solutions or areas for investigation in column 3 of the record form. You can use a code of numbers (1 to 33) for the causes, and letters (A to O) for solutions, to avoid writing a suggested remedy more than once.

Turn the page

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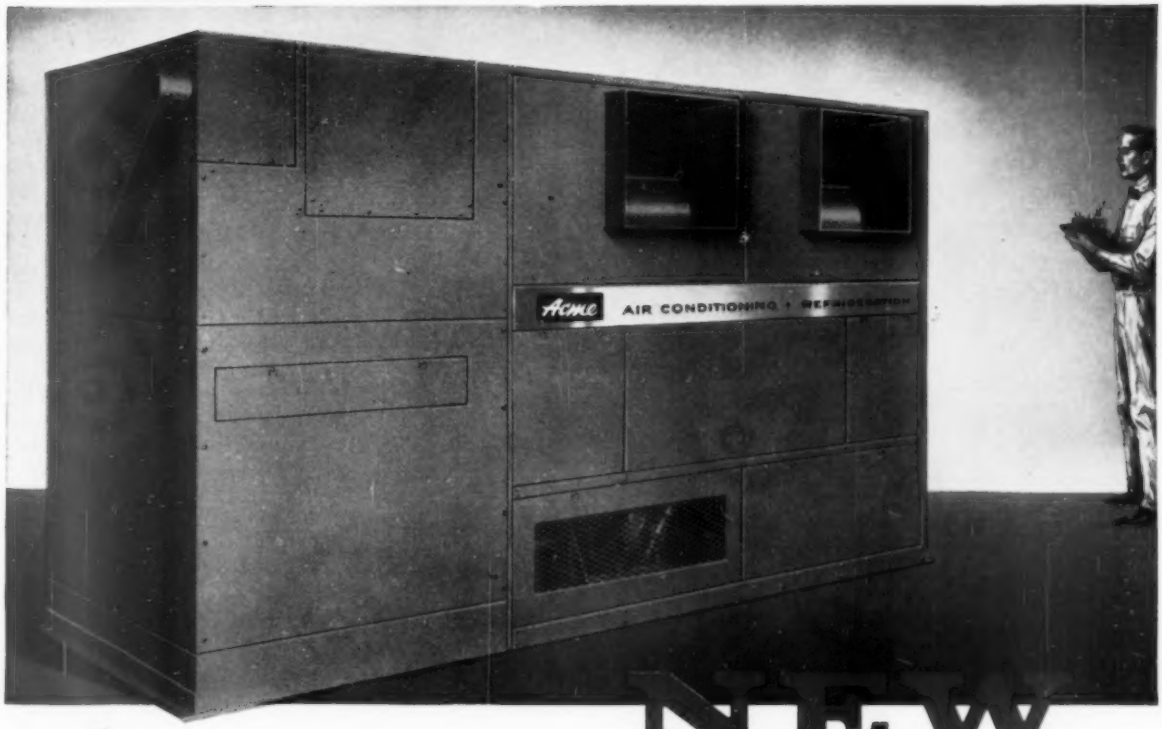
Acme ... the **practical** approach to air conditioning



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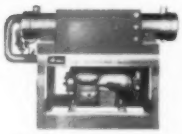

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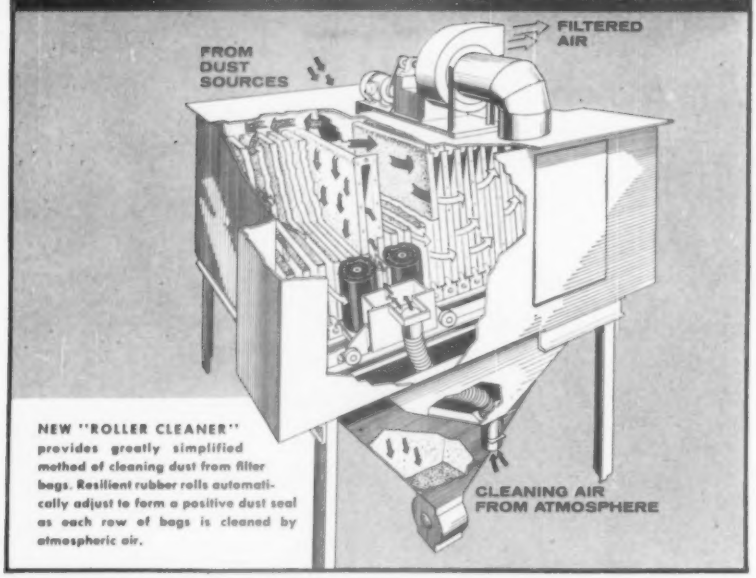
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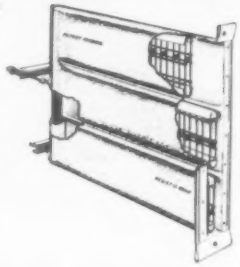

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AUDITING PLANT LAYOUTS

Begins on page 212

It may appear that we have a very complicated problem, with many possible avenues for approaching a solution. Because of the nature of the charts some of the suggested solutions may not be applicable to a particular situation. These solutions can be dropped. But don't be overanxious to discard even the remotest possibility at this point.

4. Indicate in column 4 of the record form departments or individuals to whom responsibility is assigned for further investigation and analysis of the probable causes.

5. Plan for a follow-up, to assure that. . .

. . . *Causes have been identified.*
. . . *Solutions have been devised.*
. . . *Solutions have been installed.*
. . . *Solutions are solving problems.*
. . . *Solutions are not creating additional problems.*

In the example shown in the record form the checklists produced 23 ideas for the solution of a problem caused by "scattered buildings."

WORDS OF WARNING

This approach is not a formula for solving all plant layout problems. It is simply a guide to:

1. Identifying problems.
2. Determining their causes.
3. Finding solutions.

The procedure may appear cumbersome and unworkable. But it is the thought pattern involved that is important: *indicators* that lead to *causes* that lead to *solutions*.

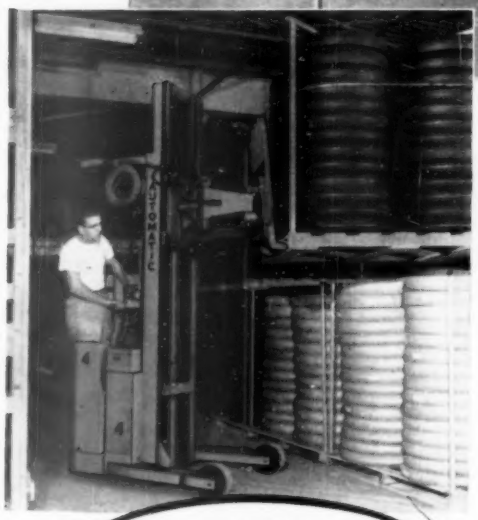
Without such a detailed approach the average analyzer would most likely come up with a half a dozen ideas, narrow them down to one or two, proceed to a solution from there. With the large number of possibilities presented here, there's greater assurance that uncommon or remote angles won't be overlooked.

In working with the over-all approach, the analyst will gradually absorb the procedures involved and eventually will develop his own shortcuts and adaptations to minimize the paperwork. Our primary objective here is to establish an orderly method of attack in seeking plant layout improvements and to assure ourselves that no stone is left unturned in that search. **END**

AUTOMATIC

Introduces New "Triple-Action" Transveyor

Swings load right or left 30°



MODEL ESRF

Lifts, Reaches and Swings...Does Fast, Efficient Job in Spaces Too Cramped for Conventional Trucks

The Transveyor's compact low-height reach type mechanism permits greater utilization of existing storage space and the higher stacking of loads...lifts 130 inches from an overall collapsed mast height of 83 inches. It literally reaches around corners...forks swing in unison right or left up to 30°...one control operates the swing and reach type mechanisms simultaneously or individually.

The New Model ESRF can handle various sizes of pallets and skids...work with any existing rack or stacking installation...and eliminate space between loads...because the base arms do not straddle the load.

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CATALOG NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

BUILDING AND EQUIPMENT

1—Cable, Piping Supports. Catalog No. 858, 78 pages, tells about systems to hold power and control cables and instrument piping. Describes various supports; index lists systems, fittings, other data. Drawings. *P-W Industries, Inc.*

2—Metal Lath, Gratings, Decks. Three catalogs: WC-240-A (8 pages) describes metal lath uses; WC-250-A (4 pages), high-strength decks for concrete roof, floor slabs; another 4-pager, gratings, partitions. *Wheeling Corrugating Co.*

3—Foamglas Insulation. New type of cold storage enclosures uses this cellulose glass insulation for low temperature space. This and other applications are discussed in 12-pager (FL-104). Technical data, photos. *Pittsburgh Corning Corp.*

4—Floor Tile. Catalog (20 pages) has descriptions and specs of line of flooring products. Handy index of colors for each product; floor tile selection and properties chart. *The B. F. Goodrich Co.*

5—Heating Coils. Here's a 32-page illustrated bulletin (No. 890) that describes standard steam, steam distributing, and hot water coils. Has 8 pages of temperature-rise charts and selection info. *American Air Filter Co., Inc.*

6—Fans. This catalog (No. 8914, 4 pages) discusses 42 low-pressure and 50 high-pressure fans. Gives fan speeds, motor hp., quietness ratings, installation drawings, and dimensional data. *American-Standard, American Blower Div.*

7—Air Distributing Units. This 4-page illustrated catalog (No. 1635-B) covers line of blowers for multi-zone central air conditioning systems. Performance and application data, specs, diagrams. *Westinghouse Electric Corp.*

8—Structural Systems. Rigid frame column and rafter assemblies, combination acoustical ceiling and roof decks, punched channel studs, are some of the products described in this 24-page catalog. Application photos. *Stran-Steel Corp.*

9—Steel Buildings. Four types of buildings and three kinds of steel covering materials are presented in 4-color, 16-page catalog (SX-2058). Interior finishes range from simple to elaborate. *Armco Drainage & Metal Products, Inc.*

10—Centrifugal Pumps. Bulletin 720.4 (8 pages) discusses single-stage side-suction pumps with open propeller. In 13 sizes—1¼- to 8-in., capacities to 3000 gpm., heads to 180 ft. Specs, dimensional chart, photos. *Goulds Pumps, Inc.*

MECHANICAL

11—Vari-Speed Motodrive. Bulletin M-588 (8 pages) explains special features of this sanitary type drive. Includes diagrams of single reducer vertical and other models in various flow styles. Dimensions, etc. *Reeves Pulley Co.*

12—Gear Couplings. New lightweight coupling with nylon sleeve is described in 4-page bulletin (No. N-1). Gives tabular data covering horsepower, speed ranges, and bore sizes available. Photos, diagram. *Sier-Bath Gear & Pump Co., Inc.*

13—Instrument Bearings. Precision and ultra-precision thin section ball bearings are presented in 24-page catalog (No. 59). Includes dimension tables, bore sizes, load ratings, other data. *Split Ballbearing Division MPB, Inc.*

14—Speed Reducers. Here's a 4-page bulletin (5018) that describes convenient mounting for top, bottom, vertical, side-wall or angled drive of worm gear speed reducers. Has hp. and torque data, drawings. *DeLaval Steam Turbine Co.*

15—Power Transmission Equipment. This 8-page bulletin (No. 3101) covers maker's complete line of sheaves, V-belts, flat-belt pulleys, pillow blocks, couplings, other products. Technical tables, drawings, photos. *T. B. Wood's Sons Co.*

16—Gears. Products, plant and quality control facilities of one of the largest manufacturers of gears are illustrated in Bulletin 26 IG (12 pages). Info on capacities, processes, materials, equipment, etc. *Illinois Gear & Machine Co.*

MAINTENANCE

17—Angle Vises. Here's a slim 12-pager (No. AV-158) that tells about company's new model, with specifications of complete line of angle vises and plates. Includes data for planning set-ups, photos of applications. *Wesson Co.*

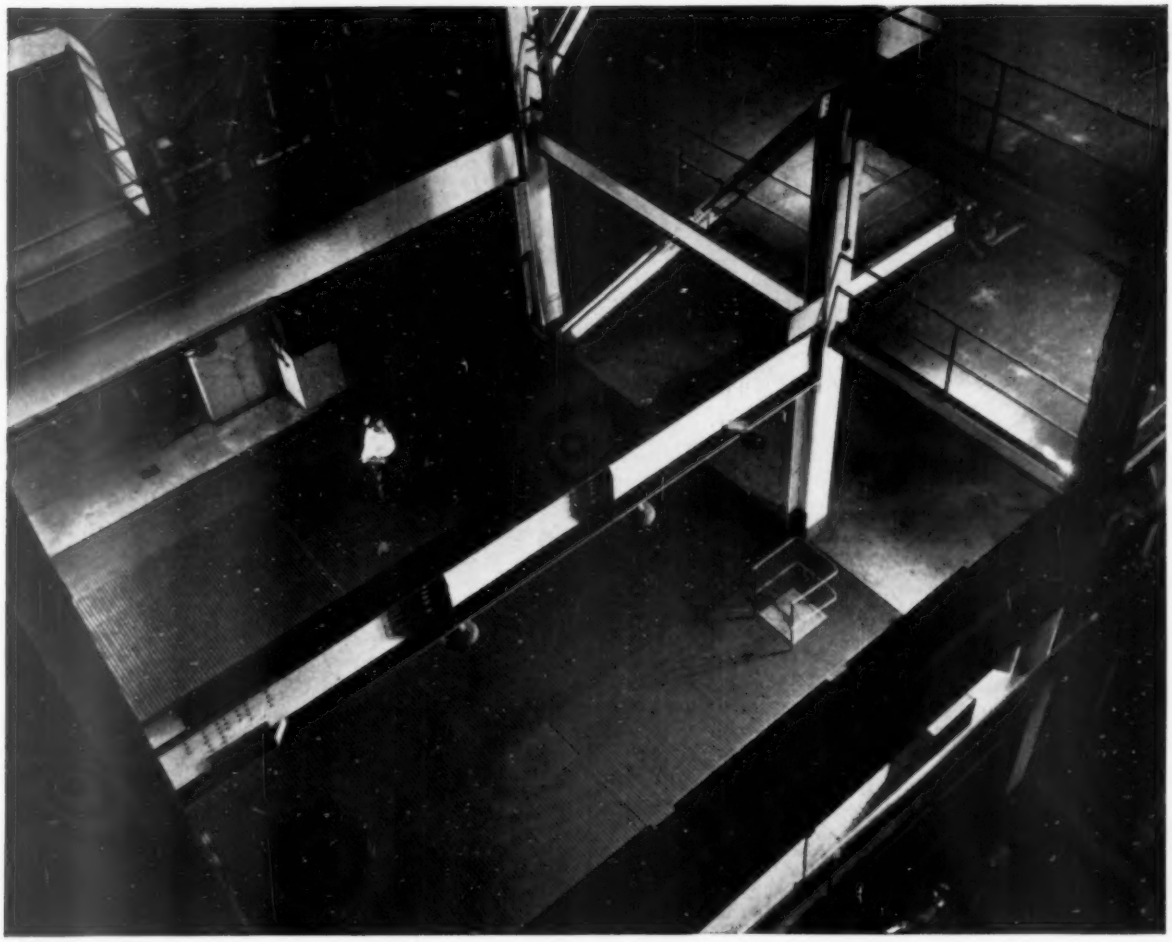
18—Radial Saws. Portable 10-in. and new 9-in. models are described in Catalog AD-1164 (12 pages). Over 40 photos of actual woodworking operations from cross-cutting to tongue and grooving; also accessories. *Rockwell Mfg. Co.*

19—Portable Heaters. When is a salamander not a salamander? When it's a portable heater as described in this 4-pager (No. 259A). Also covers blower and infra-red heaters, hose, and accessories. Photos of nine models. *Insto-Gas Corp.*

20—Brushes. Catalog BB83 (40 pages) is a guide to brush selections for use in many fields. Covers fibers, materials, manufacturing methods, including power-driven models, ball brushes, etc. All illustrated. *Braun Brush Co.*

21—Rotary Compressor. A rotary that "loafs along" at only 1100 rpm. while delivering full rated 365 cfm. at 100 psi. is discussed in 4-page Bulletin P-121B. Specs, photos. *Westinghouse Air Brake Co.*

Turn the page



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22—Electric Cleaners. Large-capacity tank models and lightweight hand cleaners, with optional equipment, are described in 6-pager. Said to be "the answer to all dust cleaning problems from floor to ceiling." *Ace-Sycamore, Inc.*

23—Battery Chargers. This 4-page bulletin (6202.1) tells about precision-charge lead-acid battery chargers. Four models cover wide range of battery capacities. Lists easy-to-use features; has cutaway photo. *Lincoln Electric Co.*

ELECTRICAL

24—Distribution Centers. Here's a 4-page bulletin (No. 12004A) that describes packaged substations (indoor or outdoor construction) and components. Ranges, types of transformers, installation info, photos. *I-T-E Circuit Breaker Co.*

25—Adjustable Speed Drives. Bulletin GEA6234B (8 pages) discusses general purpose drives, one hp. half-wave and one to four hp. full wave. Covers standard and optional features; has dimensional tables, photos. *General Electric Co.*

26—Reduced Voltage Starters. Advantages of autotransformer, closed transition connection, primary resistor and reactor, etc., are explained in Bulletin 14B8192 (12 pages). Horsepower ratings, other data. *Allis-Chalmers Mfg. Co.*

27—Gear Drives. Capacity, lubrication, accessibility, and flexibility of motorized gear drives are covered in Bulletin No. 2350 (4 pages). Drawing shows construction; includes engineering and dimensional data. *The Louis Allis Co.*

28—Electrical Equipment. This 6-page bulletin (2710) describes construction of Condulet equipment for hazardous locations. Includes information on variety of explosion-proof devices—from lighting to motor controls. *Crouse-Hinds Co.*

29—Fusible Panelboards. Bulletin No. 3-230, 8 pages, tells about new products for meeting power handling requirements of various systems. Has selection guide for these quick-make, quick-break units. Photos. *Federal Pacific Electric Co.*

30—Switches. Pushbutton stations, resistors, control circuit switches and other electrical control products are described in Bulletin 958 (8 pages). Includes photos of assembled controllers. *The Euclid Electric & Mfg. Co.*

31—Control Cables. Specifications of small diameter station, flexible and supervisory control cables with 2 to 19 conductors are listed in a 6-page bulletin. Covers color coding for circuit identification, etc. *Chester Cable Corp.*

32—Plastic Conduit. This 4-page catalog describes conduit for various applications—large or small, underground or underwater, for communication or power lines. Lists sizes, types, single or multiple ducts. *Southwestern Plastic Pipe Co.*

MATERIALS HANDLING

33—Transporter. "How to give one hand the power to move tons" is one of the facts covered in this 16-page illustrated bulletin. Discusses several types of walkies and how to select right one for a job. *Automatic Transportation Co.*

34—Reactor Crane Control. Here's an 8-page illustrated bulletin (GEA-6867) that tells how control offers stepless, static a-c crane operation. Gives application, installation, maintenance data; schematic diagrams. *General Electric Co.*

35—Materials Handling Equipment. Engineering and Application Booklet 2008-N (revised) in 12-pages covers overhead materials handling installations. Photos. *The Cleveland Crane & Engineering Co.*

36—Overhead Cable Conveyors. Bulletin 40A is a 4-pager that tells how to have the conveyor you want constructed from standard stock parts. Shows cable, trolleys, tracks, turns, drives, and other components. *The E. W. Buschman Co.*

37—Magnetic Crane Controls. Description and applications of these a-c cab- or floor-operated cranes are presented in Bulletin No. 6431 (4 pages). Gives performance data, component and enclosure photos. *The Electric Controller & Mfg. Co.*

38—Storage Racks. This illustrated 12-pager discusses easily assembled materials storage racks. Two men can install the racks without use of tools. Come in various depths and heights with adjustable openings. *Chicago Tramrail Corp.*

39—Keg, Carton Handling. Here's a case history bulletin (No. 509-2, 6 pages) that describes palletized handling of kegs and multi-sized cartons. Electric fork-lifts and trucks make "big jobs seem easy." *Lewis-Shepard Products, Inc.*

40—Stacking and Loading. "How to Stack and Load Corrugated Shipping Boxes" is a 16-pager that is No. 2 in the H&D Little Packaging Library series. Includes methods of estimating storage space and other info. *Hinde & Dauch.*

41—Conveying Systems. This 16-page bulletin (M-588) points out how pneumatic conveying systems can reduce plant operating costs. Covers high and low density systems and equipment. Diagrams and photos. *Day Sales Co.*

42—In-Plant Trackwork. An illustrated 8-pager describes turnouts, frogs, guard rails, switch stands, and other equipment for in-plant rail trackage. Gives specs, other technical data, diagrams, photos. *American Brake Shoe Co.*

PIPES AND VALVES

43—Pipe Fittings. Here's an 86-pager with info on tube welding, screwed and socket welding fittings, and corrosion weight flanges. Includes data on welding stainless steel, manufacturing standards, and specs. Tab-indexed. *Ladish Co.*

44—Connectors. Catalog No. 658 (16 pages) illustrates and describes standard flexible metal hose con-

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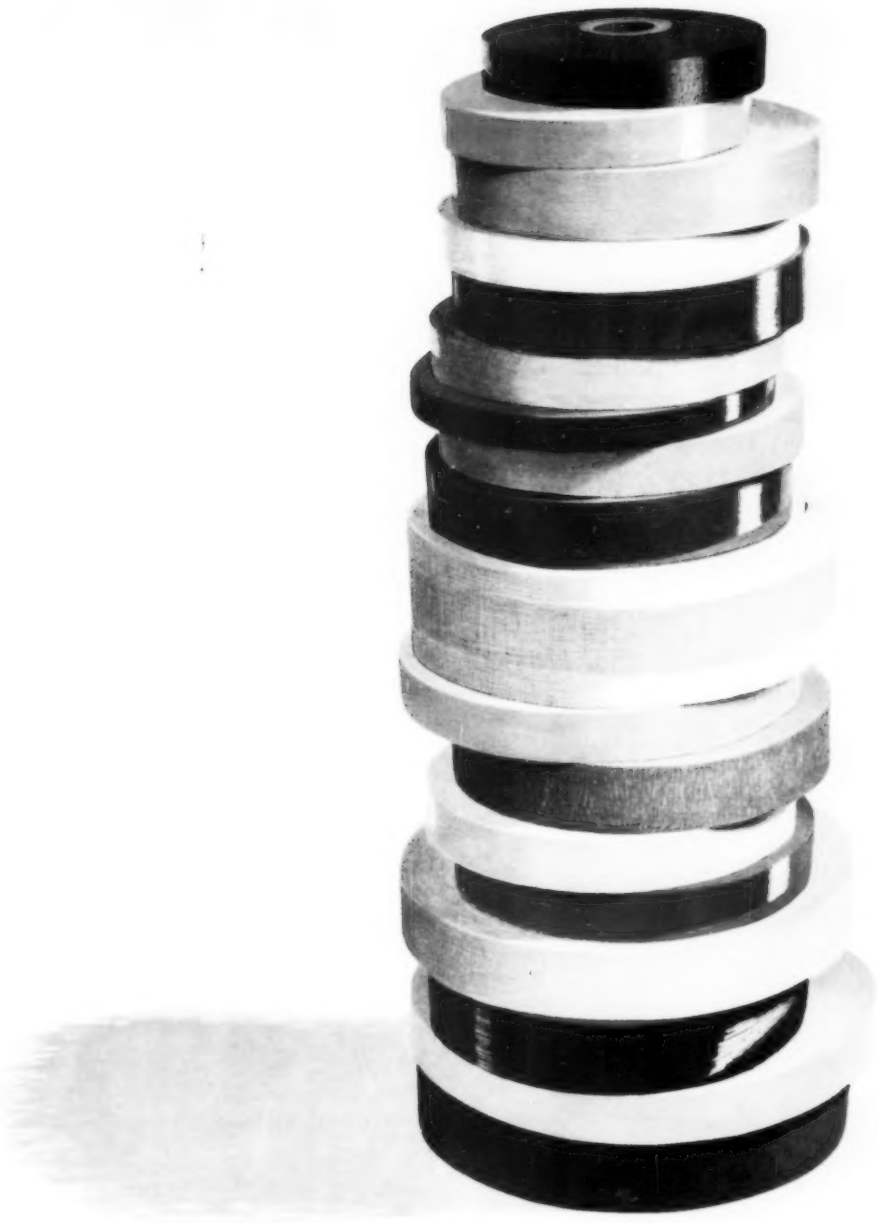

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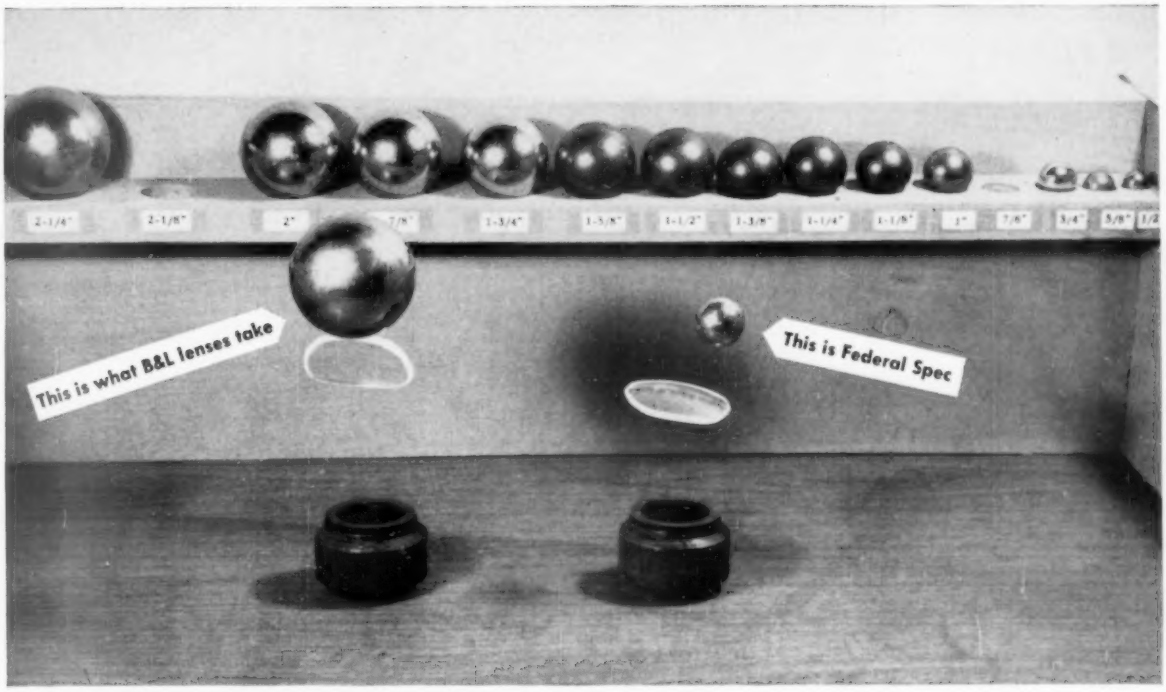
NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION

For more facts circle 584 on Reader Service Card

B&L Bal-SAFE lens takes blow 14 times heavier than "standard"



Here you see two bouncing steel balls stopped in mid-air by the magic eye of the high speed camera. The balls were dropped simultaneously from a height of more than four feet on a pair of B&L Bal-SAFE safety lenses.

There's a story in this picture . . . but it's not in the photography. It's in the fact that a B&L Bal-SAFE lens, on the average, takes a blow 14 times heavier than that required by Federal specification. The larger ball in the photo represents a force 14 times greater than the small ball. (See chart below).

Eye accidents strike like lightning. Quicker than reflex can set up defense, the impact comes . . . from hurtling object or particles . . . and grave, costly eye injury may result. How much protection do your workers get against it?

The U. S. Bureau of Standards says a safety lens must withstand impact of 0.4122 foot pounds. The test is commonly made by means of a ⅞ inch steel ball dropped from a height of 50 inches. Most makes of safety lenses are thus tested. All must meet Federal specifications. But these specifications do not suggest the measure of safety above and beyond the minimum . . . such as the measure in Bal-SAFE lenses.

Through recent technological improvements, B&L toughens Bal-SAFE lenses—from a minimum of 5—to an average of 14 times the accepted standard. It costs you nothing extra, but it gives you so much extra—in protection for your workers' eyes, in security for the corporate purse.

For details on Bal-SAFE lenses and full line of B&L PROTECTION—*PLUS* Safety Eyewear, ask your distributor of B&L eye safety products.

KINETIC ENERGY OF STEEL BALLS

Ball Dia.		Weight Grams	Weight Pounds	Ratio To 0.50" Ball	Striking Energy 50" Drop Ergs.	Ft. Pounds	
½"	0.500"	8.5	0.01874		1.058 x 10⁴	0.0780	
⅝"	0.625"	16.6	0.03660	1.953	2.092 x 10⁴	0.1542	
¾"	0.750"	28.0	0.06173	3.294	3.486 x 10⁴	0.2571	
⅞"	0.875"	44.9	0.09898	5.282	5.590 x 10⁴	0.4122	A
1"	1.000"	66.8	0.14726	7.859	8.317 x 10⁴	0.6133	
1⅛"	1.125"	94.9	0.20921	11.165	11.815 x 10⁴	0.8713	
1¼"	1.250"	130.3	0.28726	15.329	16.347 x 10⁴	1.2055	
1⅜"	1.375"	173.5	0.38249	20.412	21.601 x 10⁴	1.5930	
1½"	1.500"	225.1	0.49625	26.482	28.025 x 10⁴	2.0667	B
1⅝"	1.625"	286.1	0.63073	33.658	35.620 x 10⁴	2.6268	
1¾"	1.750"	351.6	0.77513	41.365	43.774 x 10⁴	3.2282	
1⅞"	1.875"	435.6	0.96032	57.247	54.232 x 10⁴	3.9994	
2"	2.000"	529.7	1.16644	62.247	65.886 x 10⁴	4.8588	
2⅛"	2.125"	634.9	1.39969	74.694	79.157 x 10⁴	5.8376	C

A *Federal spec for impact resistance,* B *B&L minimum,* C *B&L average.*

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BY THE THOUSANDS

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nectors, and new line of wet heat connectors. Lists end fittings. Has specs, installation info, sizes, diagrams. *Cobra Metal Hose.*

45—Hose, Tube Assemblies. Technical bulletin (No. 100) covers medium- to low-pressure hydraulic hose and tube assemblies. Follows easy-to-use arrangement—according to pressure requirements. Drawings. *Eastman Mfg. Co.*

PRODUCTION

46—Flow Transducer. Here's a 4-page brochure that discusses transducer specifically designed for measurement of single or bi-directional flow. Shows operating principle with drawing; has chart, other data. *Ramapo Instrument Co.*

47—Process Stream Analyzers. Bulletin CL-4000 is an 8-pager that describes industrial pH equipment, gas chromatographs, infra-red and oxygen analyzers, and others. Specs, instrument applications. *Beckman/ Process Instruments.*

48—Hydraulic Weighing Systems. This "plan-it-yourself" bulletin (No. 582) has 16 pages of information for the application of Way-Pac systems to weighing jobs. Arranged for easy reference to technical data. *The A. H. Emery Co.*

49—Flowmeters. Five specification sheets (51-1101B-1 to 5) and an 8-page catalog (10D1416) tell about obstructionless magnetic flowmeters. Include technical data on indicating and controlling instruments. *Fischer & Porter Co.*

50—Auto-Torque Driver. This 4-pager (SD-B1) describes how screws and nuts are driven automatically. Shows various models. Specs, installation info, cutaway drawing, photos. *Dixon Automatic Tool, Inc.*

51—Turret Lathes. Here's an 8-page catalog (Form LO-5808) that tells about ram type lathes with "completely automatic operation from start to stop." Includes specifications, operating features, photos. *Jones & Lamson Machine Co.*

52—Turret Drills. Illustrated 12-pager covers 6- and 8-spindle automatic hydraulic and 6- and 8-spindle tape-controlled turret drills and machine accessories. Has speed charts, specs, diagrams, and photos. *Burg Tool Mfg. Co., Inc.*

53—Vibrator. What is said to be a new concept of precision finishing is subject of Bulletin No. 258 (12 pages). These vibrators work 10 to 100 times as fast as tumbling barrels. "Before-and-after" photos. *Lord Chemical Corp.*

54—Motor-Driven Timers. Two 4-page catalogs: No. 400 describes interval timers that can be re-set automatically or manually; No. 500 covers re-cycling timers in a tandem series. Both have wiring diagrams, data. *Industrial Timer Corp.*

55—Work Holding Fixtures. Catalog 9158CJ has 24 pages of info about machine vises, rotary tables, adjustable angle plates, standard set-up fixtures, and new clamp-N-jack system for all types of machine tools. *Universal Vise & Tool Co.*

56—Packaging Machinery. Six-page catalog explains how company's newly acquired Packmaster line of packaging machines function. Includes cost study and other details. *Sundstrand Machine Tool Co.*

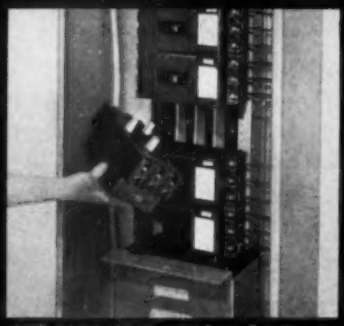
57—Wire Stitching. Flat and curved methods of stitching, other operations are described in Catalog AD-278 (28 pages). Has specs for over 30 machines. Photos show box, book, metal stitching, wire sizes, colors. *Acme Steel Co.*

58—Welding Equipment. Here's a 16-page catalog that describes resistance welders, welding heads, power supplies, and accessories. Includes comparison of stored-energy vs. a-c welding. *Unitek Corp.*

Turn the page

Electrical maintenance made easier with 3-way STABreaker Flexibility

STABreaker for AB-I's



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The Best in Electrical Distribution and Control Equipment.

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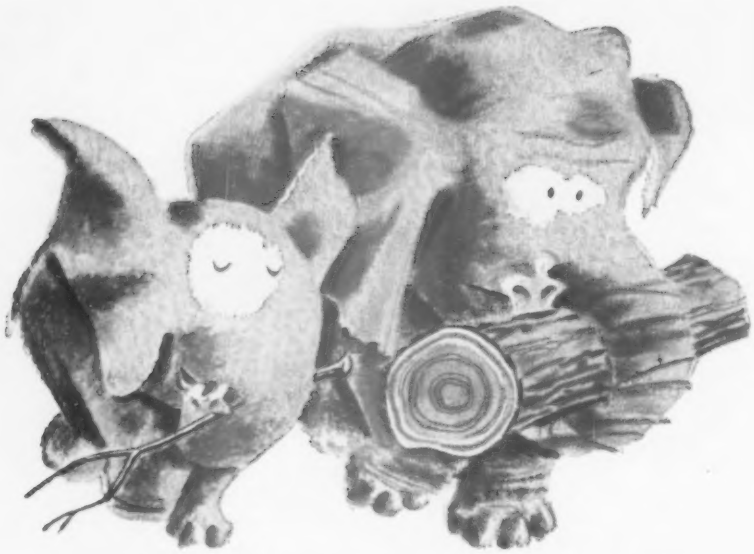

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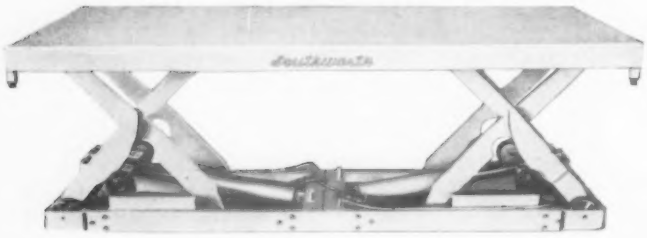

Model from LT Series designed to handle long sheets, bars, rolls or large frames and assemblies, with capacities up to 24,000 lbs.; vertical travel to 64". For further details on our four Series write to:

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FACTORY / CATALOG NEWS

Begins on page 220

For more about these items, circle item numbers on Reader Service Card next to back cover.

MISCELLANEOUS

59—Instruments and Apparatus. This 1959 catalog (175 pages) describes more than 450 pieces of equipment for laboratories and plants. Products include constant temperature baths, drying ovens, centrifuges, clamps. *Labline, Inc.*

60—Heaters and Ventilators (leasing plan). Some like it hot, some like it cold—this folder (5 pages) tells about plans for leasing air conditioners, heating and ventilating systems. Gives details of leasing agreements. *Hudik-Ross, Inc.*

61—Work Simplification. Details of a cost analysis and supervisory training program are explained in foldout brochure. Outlines step-by-step technique of studying jobs and better ways of doing them. *S. J. Fecht and Associates.*

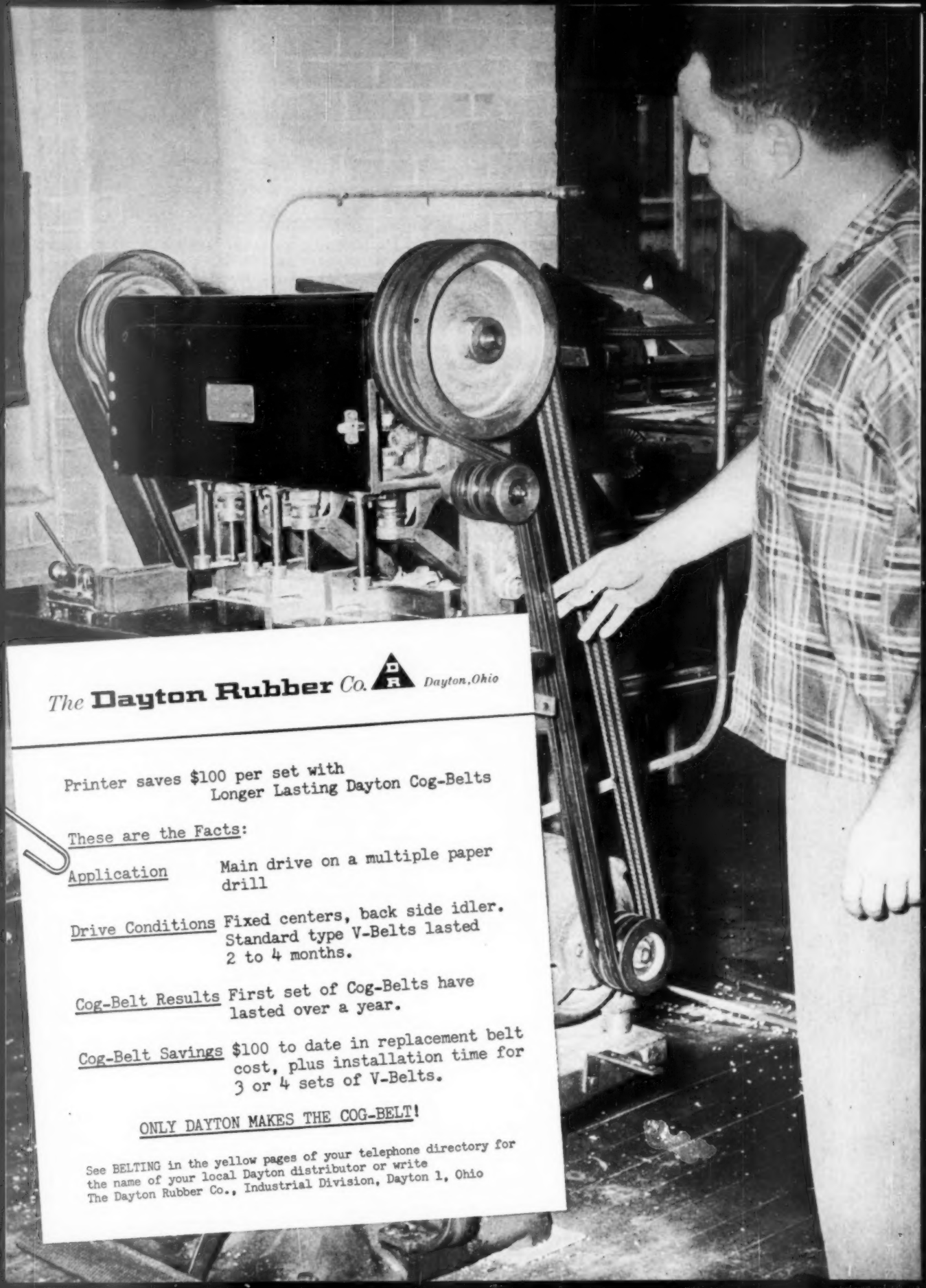
62—Radiant Heaters. How to solve "spot-heating" and large area heating problems are discussed in Bulletin F-1614 (4 pages). Includes info on input controllers, thermostats, magnetic contactors; selection guide. *Edwin L. Wiegand Co.*

63—Wipers. A duster is a duster is a duster. Not so. These soft, highly absorbent cellulose wipers clean quickly, wet or dry, as described in this 12-pager (Form KSB-19). Shows applications of wipers. *Kimberly-Clark Corp.*

64—Production Record. "Can Efficiency Be Measured?" is the title of an 8-page booklet (No. 441) that gives details about the machine that can help do it. The Centralograph (made in Sweden) provides accurate information in many applications. *D. C. McGiehan.*

65—Bin Card Holder. It looks gadget-y but it's useful in bin systems for inventory control purposes. This 4-pager explains how plastic holder holds standard IBM or Rand business machine cards for inventory control. *Cowan Boyden Corp.*

For more facts Circle 589 on Reader Service Card ➤



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Printer saves $100 per set with
Longer Lasting Dayton Cog-Belts

These are the Facts:

Application	Main drive on a multiple paper drill
Drive Conditions	Fixed centers, back side idler. Standard type V-Belts lasted 2 to 4 months.
Cog-Belt Results	First set of Cog-Belts have lasted over a year.
Cog-Belt Savings	$100 to date in replacement belt cost, plus installation time for 3 or 4 sets of V-Belts.

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New 5-lb. can of Mac's Waterless Hand Cleaner slips right on dispenser. Here's all you do:

1. Turn can upside down and remove plug.

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3. Remove lid. Drop in follow-plate.

4. Replace lid loosely. Dispenser is ready to use. Always works. Foolproof.

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Mac's Waterless Hand Cleaner can be used with or without water. Contains Lanolin ... won't dry skin. Your NAPA or company jobber has it. Order now!

MAC'S **MAC'S SUPER GLOSS CO., INC.**
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DON'T WAX IT, MAC'S IT!

FACTORY **BOOKS**

By CARROLL W. BOYCE, Manager, Features and Departments, FACTORY

The Scanlon Plan Reassessed

Labor-management harmony as visualized and fulfilled under the direction of the late Joe Scanlon makes for soul-searching reading in *The Scanlon Plan*. When faced with facts—and there are many of them in this book—the plant operating manager will be hard put to defend his traditional management-expert, management-prerogative method of employee supervision. The authorities who speak in this book make a convincing case for true employee participation, as compared with any philosophy that falls short of it.

In an over-simplified nutshell, the Scanlon plan is another version of profit-sharing, with the incentive base being the ratio of cost of all labor to the value of goods shipped rather than some percentage of net profit. Scanlon's viewpoint is that productivity (output per labor hour) is something a workman can see and measure; that profits are too remote to be real.

What makes the plan unique is that it was originally negotiated between a strong labor union and a strong management—and most of its applications since have been in similar situations. Management "rights" are not sacrificed, but management agrees to open its decisions about production matters to the suggestions and harsh criticisms of the rank-and-file. This is no mere offer of a "sense" of participation; it is what Scanlon calls "collective bargaining come of age."

This book contains important papers written by psychologists like Douglas McGregor, labor leaders like Clinton S. Golden, and Scanlon himself. They tell a miraculous story. But it's one that sometimes fails to ring true. If their experience is valid, the engineered approach to management is aimed at correcting situations that are more effect than cause. And, in their view, participation alone can release the full production potential of management and labor. It's well worth your while to read this book, draw your own conclusions.

(Editor's Note: This review was prepared by Lester R. Bittel. His report is free of the bias that would surely be introduced by anyone who knew Joe Scanlon personally. The tremendous force of Joe's personality—as indicated in the introductory "tribute" chapters—was such as to arouse the suspicion that the success of the Scanlon plan might derive more from Joe himself than from any inherent value. The continued success of his plan in the three years since his death shows these suspicions to be unfounded. One point that Bittel could not make: All of Joe's friends, colleagues, and students will want a copy of this book for its value as a memorial to Joe Scanlon, the man. C.W.B.)

The Scanlon Plan: A Frontier in Labor-Management Cooperation, edited by Frederick G. Lesieur. The Technology Press of M.I.T. and John Wiley & Sons, Inc., 440 Fourth Ave., New York. 173 pages. $4.50.

Creative Thinking Hits the Bull's Eye

Reinhold Publishing Company introduces its "management science series" with an undersize book that packs an oversize punch. In a mere 168 pocketbook-size pages, Charles S. Whiting has ripped apart the whole gamut of techniques that come under the general heading of *Creative Thinking*. Then he puts them back together again, in a better perspective than we have seen before.

Not everyone will agree with all of Whiting's evaluation of the strengths and weaknesses of these techniques (we don't). But considering the degree of personality involvement in any of them, you couldn't expect 100% agreement. Brainstorming, for example, is probably subject to as many personal biases as there are persons. We think we could find some of Whiting's showing through—though that could just be our bias clashing with his objectivity.

In any event, you're sure to find

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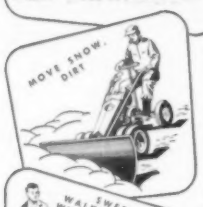
The precise control, amazing ease of operation and riding comfort of the Steering Sulky with 75"-cut Gang Mowers make large-area mowing quick and easy. Now, new Lawn Sweeper and Aerator also available.



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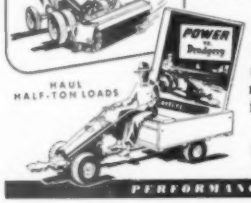

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Begins on page 230

this book both stimulating and useful. It's not a substitute for Alex Osborn's *Applied Imagination*, but it is an absolutely essential companion and supplement to it. If you're looking for ideas on how to generate more ideas, *Creative Thinking* scores a bull's eye.

Creative Thinking, by Charles S. Whiting. Reinhold Publishing Co., 430 Park Ave., New York 22. 168 pages. $3.95.

Design Concepts for Schools and Plants

Here's a provocative (and handsomely illustrated) book by the title of *Schoolhouse* that deserves attention for two reasons:

- Schools are a problem today for all of us as individuals, and with the growing recognition of the community responsibilities of industry, managers find themselves doubly involved. (The book is directed exclusively to these problems.)
- Many of the design and construction techniques for the best of the nation's newest schools could well be adopted or adapted in the construction of industrial plants (and most particularly and most directly in the general office, engineering, research sections of those plants). The book makes no mention of these possibilities; you'll be on your own in determining what materials, what space allocation techniques, what construction methods might be used to advantage by industry. But we venture the guess that you can't help but be stimulated.

After you've examined and read the book (if you're still willing to part with it), you'll be doing your community—and your children—a favor if you can pass it along to a member of the local school board. And if there happens to be a new school under active consideration in your locality at the moment, be *sure* that the school board, the planning committee, and the architects see and read this book.

Schoolhouse, by the Joint School Research Project. Simon and Schuster, 630 Fifth Ave., New York 19. 271 pages. $10.

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25% more power!

6¾ inches shorter!

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than the size 534

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Rectifier Division

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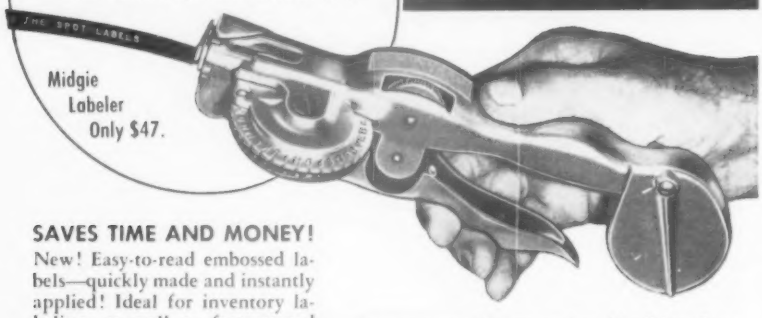

Midgie Labeler Only $47.

SAVES TIME AND MONEY!

New! Easy-to-read embossed labels—quickly made and instantly applied! Ideal for inventory labeling, as well as factory and field identification procedures. Tapes available in Vinyl Plastic, Aluminum, Copper, Stainless Steel, Monel, etc. Self-feeding from roll of tape in magazine.

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DEALERS: Many territories open—write today for details on Dymo dealership

WRITE FOR ILLUSTRATED FREE BROCHURE

DYMO CORP.

2544 Tenth St., Berkeley 10, Cal.

For more facts Circle 596 on Reader Service Card

FACTORY FILMS

Breaking the Price Barrier presents what is called the revolutionary low cost of "100" power drive for a pipe machine. The film highlights time, cost, and work-saving features. Shows threading of pipe or conduit, and other portable power equipment. 16mm, color, sound, 14 min. For loan, write:

Oster Mfg. Co., E. 289th St. & Nickel Plate RR, Wickliffe, Ohio.

Heat . . . the Science and Economics of Its Control is dramatized in this film. It explains how to select insulation, describes problems of heat transfer, tells about the vital role of research in developing insulation for today's complex needs. 16mm, color, 26 min. Write:

Johns-Manville Corp., 22 East 40th St., New York 16.

Sam'l and Social Security is an animated cartoon that gives information about Federal old-age and survivors insurance—how it works and what it means to every family. Depicts the difficulties Sam'l has had with everything from dinosaurs to unemployment, disability, and old age. 16 or 35mm, color, 14 min. Write:

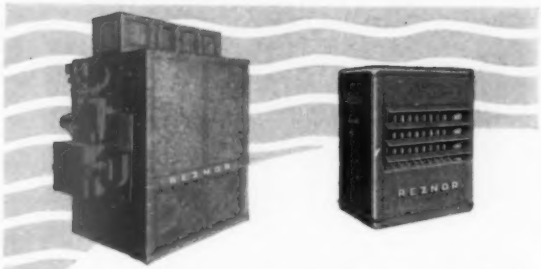
Social Security Administration, Equitable Bldg., Baltimore 2.

Corrosion, its causes and control, is the subject of this new film. It tells how anodes and cathodes form on steel surfaces, how they cause electrolytic corrosion. Discusses inhibitors, alloys, hot-dip galvanizing, cathodic protection, organic, and inorganic zinc coatings. Case histories show how problems are solved in various industries. 16mm, color, sound, 19 min. Write:

Amercoat Corp., 4809 Firestone Blvd., South Gate, Calif.

Educational Film Guide lists and describes over 6300 16mm films produced during the years 1954-58. Films are listed in an easy-to-find arrangement by titles, subjects, and sources for borrowing, rental, or purchase. Also available is the 1953 edition of the Guide, listing 11,000 additional 16mm films. To purchase these guides, write:

H. W. Wilson Co., Dept. EW, 950 University Ave., New York 52.



eliminate trouble spots

No matter how good your plant heating system may be, you probably have a few heating "trouble" spots which it just can't handle. Areas around big shipping room doors, offices where higher temperatures are required to maintain comfort, and distant drafty corners which are beyond the effective reach of a central heating system create common plant heating problems.

To each of these problems, the efficient, economical answer is supplemental heat with Reznor gas unit heaters. These completely automatic packaged units react instantly, automatically to the requirements of their immediate surroundings . . . producing heat when and where it's needed. Ask your Reznor distributor for the complete story or write for your free copy of "Modern Heating"

Look for Reznor under "Heaters-Unit" in the Yellow Pages

REZNOR
WORLD'S LARGEST-SELLING DIRECT-FIRED
UNIT HEATERS

Reznor Manufacturing Company, 89 Union Street, Mercer, Pa.

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Open plugged drains and supply lines FASTER, BETTER

with a KOLLMANN K-500

● Designed for industrial use, the K-500 makes fast work of stubborn flow line stoppages, eliminates trouble and "down time" . . . and anyone in the maintenance crew can operate it. The dolly-mounted K-500 handles up to 200′ of sectional cable (400′ with larger power units) for full-diameter cleaning of lines 3″ to 10″. Interchangeable clutch jaws quickly adapt it to lines as small as 1¼″. *Every* maintenance department can readily justify this machine . . . it will pay for itself many times over.

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WHY IT PAYS TO USE Rubbair® the true door — not a curtain, Door

One of several Rubbair Door installations at the Strathmore Paper Co., West Springfield, Mass.

STRATHMORE

READ THIS ACTUAL CASE HISTORY—

"The installation of Rubbair Doors has really solved three problems for us," said Mr. J. S. Mudgett, Chief Engineer, Strathmore Paper Co., West Springfield, Mass. "The first problem was the necessity for a door that would permit a free flow of heavy fork-lift truck traffic without requiring a stop to mechanically operate a conventional type door. The second problem was considerable heat loss to open warehouse area which was reduced by fast closing action and air seals. The third problem was maintenance costs which have been reduced because of the flexibility of the door. Of course, other benefits have been realized such as safety for workmen as well as a considerable reduction of dust and dirt from the loading platform."

RUBBAIR® DOORS Assure Trouble Free Operation With

- Flexible construction
- Safety-cushion nose
- Scuff-resistant wear panels
- Rugged V-seam hinges
- Positive air seal
- Shatter-proof windows

If you have an industrial door maintenance problem, let us help you solve it. Write us the details or send for a free illustrated catalog.

Stic-Klip®
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VERSATILE, NEW PLUG-IN STEAM GENERATOR

Series "R" SPEEDYLECTRIC generates steam to 250 psig. and temperatures to 405°F. Write today for Bulletin SG-200. Larger capacity Steam-Jet Cleaners available. Write for Bulletin JC-100.

Easily Converted to a Steam-Jet Cleaner!

For plug-in operation on 110- and 220-volt circuits, the precision-built, compact, ASME Code Series "R" SPEEDYLECTRIC steam generator is ideal for laboratory, pilot plant and even production processes requiring small volumes of high-pressure steam!

This midget-size SPEEDYLECTRIC, like all SPEEDYLECTRIC models, features safe, simple, electrode heating with precise current control. Easily converted to a Steam-Jet Cleaner for sterilizing and de-icing, by means of an accessory kit.

Visit Booth No. 1920 at the 1959 Plant Maintenance Show, Cleveland.

Pantex **MANUFACTURING CORPORATION**

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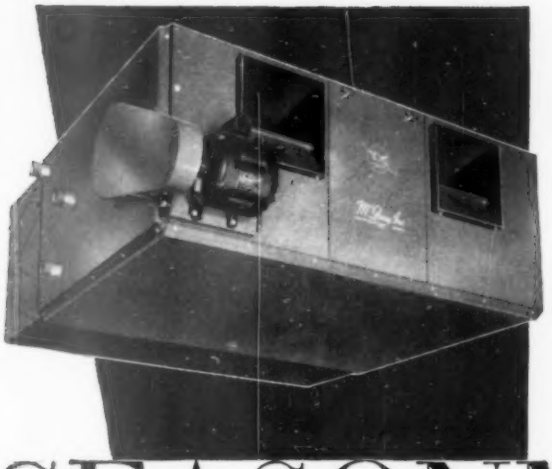


McQuay Horizontal Seasonmaster with water coil, steam coil, face and by-pass, and flat filter section. Removable panels permit complete accessibility for inspection or service. Horizontal models available in 17 sizes, ranging from 640 to 38,100 cfm.

McQuay SEASONMASTERS

for year 'round comfort

two models 17 sizes

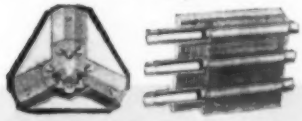
McQuay Vertical Seasonmaster with direct expansion coil, steam coil, face and by-pass, and flat filter section. Heavy gauge galvanized channel framework to form a rigid structure. Sixteen sizes are available, ranging from 640 to 29,000 cfm.

The most universal line of air conditioners in the industry

The McQuay line of Seasonmaster central station air conditioners is truly universal. It is the most versatile, the most flexible and the most complete in the industry. McQuay Seasonmaster units will both heat and cool, filter, humidify and dehumidify, when furnished with steam, water heating, water cooling or direct expansion coils in capacities from 640 to 38,100 cfm. A full line of accessories is available for any heating or cooling combination.

For small or large area air conditioning, look to McQuay. Compare the versatility, compare the quality and performance and compare the range of models. And always remember, only McQuay gives you Ripple-Fin coils, Dura-Frame construction and Galva-Seal bonderized, baked-on enamel finish. See the McQuay representative in or near your city or write McQuay, Inc., 1620 Broadway Street N. E., Minneapolis 13, Minnesota.

McQuay Means Quality



McQuay units feature the exclusive Ripple Fin Coils which create maximum air turbulence and have wide, full fin collars that act as automatic spacers to form a tube around the coil tube for positive, permanent bond, greatest heat transfer and protection. The Dura-Frame "V" channel construction provides the strength and rigidity necessary for quiet, trouble-free operation.

McQuay INC.

MAKE THE SEASONS COME TO YOU

AIR CONDITIONING · HEATING · REFRIGERATION

MATERIALS NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

Instant, Strong Bonding Cement

Instant high strength bonds are possible with a new non-flammable, water-thinned contact cement.

The new adhesive, designated Instant-Lok 4300, produces an immediate bond between such surfaces as glass, hardboard, metal, decorative high-pressure plastics, and wood, without the use of clamping equipment or long pressing cycles.

Use of the new material offers many safety advantages in addition to saving in equipment costs; it eliminates the need for ventilating hoods and spray booths. Its instant bonding feature facilitates rapid assembly-line production.

Instant-Lok 4300 can be sprayed, brushed, or roller-coated. For room-temperature application, its extended open assembly time allows fabricator diversity in adapting the material to many techniques. Adhesive can be heat-reactivated where combining is not done on the same day as coating is done.

National Starch Products Inc. (Circle 251)

These Fibers Solve Insulation Problems

A new white fibrous material that combines light weight and good heat resistance may solve most of our space-age insulating problems.

The product, fibrous potassium titanate, is a compact mass of crystalline fibers—so fine it has talc-like feel. Fibers block heat penetration by scattering infra-red rays. Available as loose fibers or fill, blocks, mats, and "lumps."

E. I. duPont de Nemours & Co. (Circle 252)

253—Quartz Thread is said to be unequalled for applications such as filters, thin insulation, etc. Reasons: purity, low thermal conductivity, low coefficient of expansion, high softening point and viscosity. Available in short lengths or continuous thread. *General Electric Co.*

254—Barrier Cream called Kerodex is greaseless, stainless, and chemically inert. A "miracle second skin," it offers hand protection for laboratory and production workers against polymers, plasticizers, silicates, and various other harsh irritants. *Ayerst Laboratories.*

Teflon for Chutes

What has been called "the slipperiest solid (static free) material" is a new continuous-molded Teflon sheet—highly stabilized and stress-free. This new material is cementable to glass, wood, metal, and concrete. It helps speed powders, chemicals, other dry materials through chutes, mixers, hoppers, feeders, and packaging machines. The Teflon sheet eliminates the need for vibration or other methods of keeping materials moving on conveyors.

W. S. Shamban & Co. (Circle 255)

Turn the page

Here's the answer to your maintenance problems!

Yes, this is a strong statement . . . but we can back it up with this new fully illustrated FREE booklet which shows in detail the latest Maintenance Management techniques . . . so easy to apply to your present maintenance setup. *It is the most comprehensive and thoroughly practical book on Maintenance Management ever produced for American business!*

The system shown in flow chart form in this book, not only assumes responsibility for repair, construction and preventive programs, but includes proper utilization and scheduling of maintenance crafts and control of ever increasing maintenance inventories. It will assist *large* and *small* firms alike in getting *better work control, better planning, better preventive maintenance, better spare parts control, better worker morale* . . . MORE FOR THE MAINTENANCE DOLLAR!

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256—Wire Cloth that is brazed after weaving prevents shifting of wires. The joints, copper-brazed at each intersection, provide a rigid structure so that wire does not shift in any direction even when subjected to severe vibration. *The Cambridge Wire Cloth Co.*

257—Polyethylene Pipe in large diameter sizes has been developed through a new extrusion technique and die design. Maker says that this pipe compound has a life expectancy of 50 years at high-pressure ratings. It can be made in any length. *Carlon Products Corp.*

258—Degreasing Solution is said to loosen heavily encrusted carbon deposits from electrodes and carburetors in 15 minutes. This Pow-A-Kit is a concentrated powder that, by adding water, becomes a powerful, fast-acting degreasing solution. *Stewart-Hall Chemical Corp.*

259—Pressure Bandage is a combination of fine cotton elastic and pure foam rubber. Elasticfoam can be applied quickly and used directly over open wounds, burns, and dermatitis. Absorbs five times its weight of moisture; can be laundered. *Conco Surgical Products.*

260—Aluminum Alloy 5083 is said to be one of the highest strength non-heat-treatable aluminum alloys ever marketed. In sheet form, it is available in O, H32, and H34 tempers, up to 60-in. wide, and in various thicknesses. *Kaiser Aluminum & Chemical Sales, Inc.*

261—Concentrated Liquid Cleaner contains an agent that chemically loosens dirt and soil so they can be rinsed or flushed away. The "Supercleaner" is said to have no unpleasant odor. For use on heavily soiled surfaces; applied with mop, spray, floor machines. *Hadco Corp.*

262—Protective Tape, paper-backed and self-adhering, is a film for use on metal surfaces to prevent damage by scratching, rusting, oxidizing, staining. Tape is put on sheet metal before it is formed, stripped off after installation. *Mystik Adhesive Products Inc.*

263—Brick stays clean with new treatment for the control of efflorescence—the green and white stains that appear on masonry walls. Here's the new process: a thin silicone deposit is applied to each brick after it leaves kiln; it then sheds water. *Dow Corning Corp.*

264—Molded Foam-and-Skin cushioning has been developed for use in carrying cases and for packaging to protect scientific instruments and other equipment. This polyurethane padding with integral skin can be molded to specifications for variety of applications. *Bostrom Corp.*

265—Conductive Cement, based on epoxy resins, offers good bond strengths to most materials. Hysol 6250 cures in 24 hours at room temperature, in 2 hours at 140 F. Uses include repair of printed circuits, bonding of electrical components. *Houghton Laboratories, Inc.*

MATERIALS LITERATURE

266—Cemented Carbides. Catalog C-16 (32 pages) replaces five booklets about Carmet modern cutting and forming tool material. Describes applications of cemented tungsten carbides in various fields. *Allegheny Ludlum Steel Corp.*

267—Insulation. This 8-page catalog (Form WPD-13) discusses various types of glass fiber insulations, and gives uses, thermal and acoustical performance data. Also covers other glass fiber products. *L. O. F. Glass Fibers Co.*

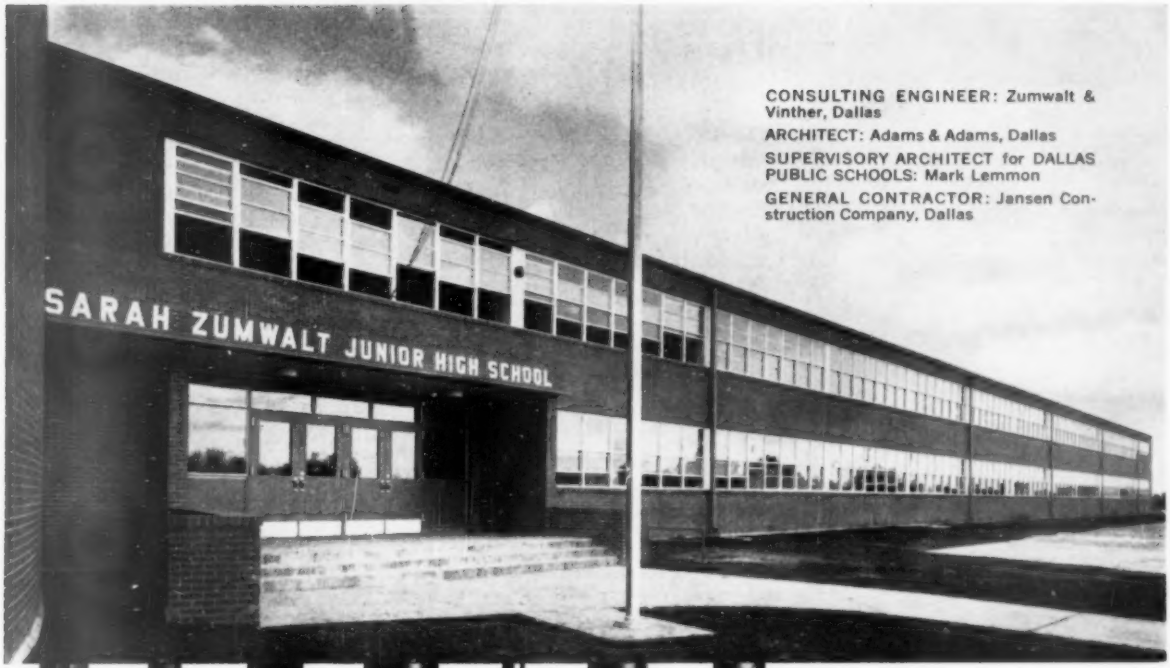
268—Lubrication. Slim folder (Form AIP-93-I) tells about bacterial inhibitor that extends life of oil emulsions used in various grinders, drills, and lathes. Extends coolant life, saves recharging time, etc. *Eli Lilly & Co.*

269—Perlite Ore. There's ore in them thar hills. 16-page brochure describes basic source and processing of this mineral. Large quantities are used for lightweight fireproofing and as insulation. *F. E. Schundler & Co., Inc.*

270—Pipe and Fittings. This 12-page manual answers questions about polyvinyl chloride rigid pipe and fittings. Has specs, flow rate data. Chart lists about 350 reagents and their effects on PVC pipe. *Mueller Brass Co.*

271—Ply-Veneer. A 6-page folder gives specs for panel product made of distended Douglas fir veneer core, laminated top and bottom with heavy Kraft liner board. Adaptable to modern production tools. *Weyerhaeuser Timber Co.*

272—Tool Steel. Here's a handy chart that lists comparable brand names of 13 major suppliers of steel. It classifies, by general type and SAE number, 16 different types of tool and die steels. *Uddeholm Co. of America, Inc.*



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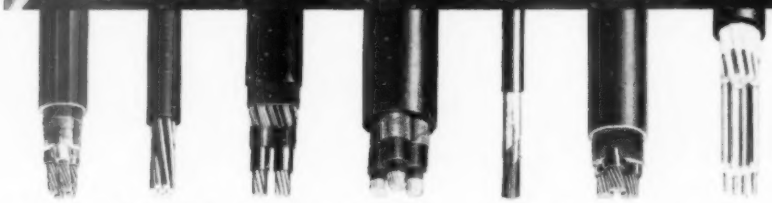

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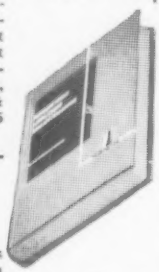

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ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

BUILDINGS

346—Dock Shelters. Facts about dock shelters. Retractable when not in use. Dazzo Products, Inc.

347—Rubber Doors. Free illustrated catalog gives complete data on rubber doors. Stic-Clip Mfg. Co.

348—Steel Grating. Bulletin 2527 contains new ideas on complete line of space-saving grating. Blaw-Knox Co.

349—Budget Buildings. Attractive, full-color brochure gives complete data and sizes. Republic Steel Corp.

350—Plastic Panels. Folder tells features and savings with reinforced panels. International Molded Plastics.

351—Safety Grating. New, complete catalog gives features of new steel and aluminum grating. The Globe Co.

PLANT SERVICES

352—Compressor. Free bulletin (179-12) gives complete details on new WN-224 air compressors. Joy Mfg. Co.

353—Fans. Bulletin 702-A on new heavy-duty rubber-lined fans for varied applications. Clarage Fan Co.

354—Dust Control. Bulletin 917, "Out of the Realm of Dust," tells about wet and dry collectors. Pangborn Corp.

355—Unit Heaters. Free copy of booklet, "Modern Heating," gives full facts and features. Reznor Mfg. Co.

356—Pumps. Copy of Stock Pump Catalog CSP-257A—capacities 325 gpm., heads to 140 ft. Bell & Gossett Co.

ELECTRICAL

357—Steel Equipment. Catalog illustrates most diversified line of steel equipment. Lyon Metal Products.

358—Motor Control. Free Catalog 5800 gives complete motor control information. Furnas Electric Co.

359—Starters. Bulletin 8130 gives data on new starter for high-voltage drives. Electric Controller & Mfg. Co.

360—Lamps. New 24-pager, "21 Industrial Lighting Problems Solved with Power Grooves." G-E, Large Lamp Dept.

361—Silicones. New booklet details the advantages of silicone-insulated equipment. Dow Corning Corp.

362—Rectifiers. Available: free guide to selection of metallic power rectifier equipment. Sel-Rex Corp.

363—Circuit Breakers. Nos. 1-155 and 1-160 on AB-I's and bus duct plug-in types. Federal Pacific Electric Co.

364—Fuses, Fuse Blocks. Bulletins FIS, BL-I, and SFB for protecting electrical equipment. Bussmann Mfg. Div.

MAINTENANCE

365—Steam Cleaning. Information and facts on new all-electric hypress sure cleaner. Homestead Valve Mfg. Co.

366—Maintenance Management. Free fully illustrated booklet describes latest techniques. Remington Rand Div.

367—Corrosion Inhibitor. Bul. 410-12-3 tells how inhibitor keeps compressors free. Hagan Chemicals & Controls.

368—Cans and Oilers. Free catalog lists complete line of cans and oilers for every purpose. Eagle Mfg. Co.

369—Vacuum Cleaning. Catalog gives information on installed vacuum cleaning systems. Spencer Turbine Co.

370—Sanitary Maintenance. Brochure, "Engineered Maintenance," on sanitary maintenance. Puritan Chemical Co.

371—Lubrication Equipment. Free catalog lists line of equipment. Alemite Div., Stewart-Warner Corp.

372—Scrubber-Vacuum. Complete literature on self-powered combination scrubber-vacuum. Finnell System, Inc.

373—Lubricants. Free: "Management Practices That Control Costs via Organized Lubrication." The Texas Co.

374—Pipeline and Drainage Cleaner. Bulletin has data on flow-line and drain-cleaning machine. Kollmann Mfg. Co.

PRODUCTION

375—Recorders. Illustrated literature describes equipment recorders for operating control. Service Recorder Co.

376—Schedule Board. Bulletin X-200 shows applications of visual control board. Graphic Systems, Inc.

377—Cylinders. Bulletin SQ 10-58 lists design range of air and hydraulic cylinders. Tomkins-Johnson Co.

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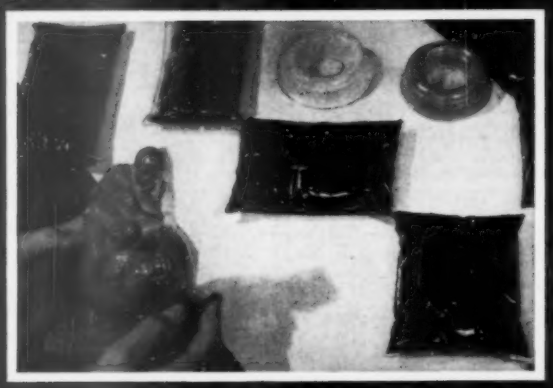

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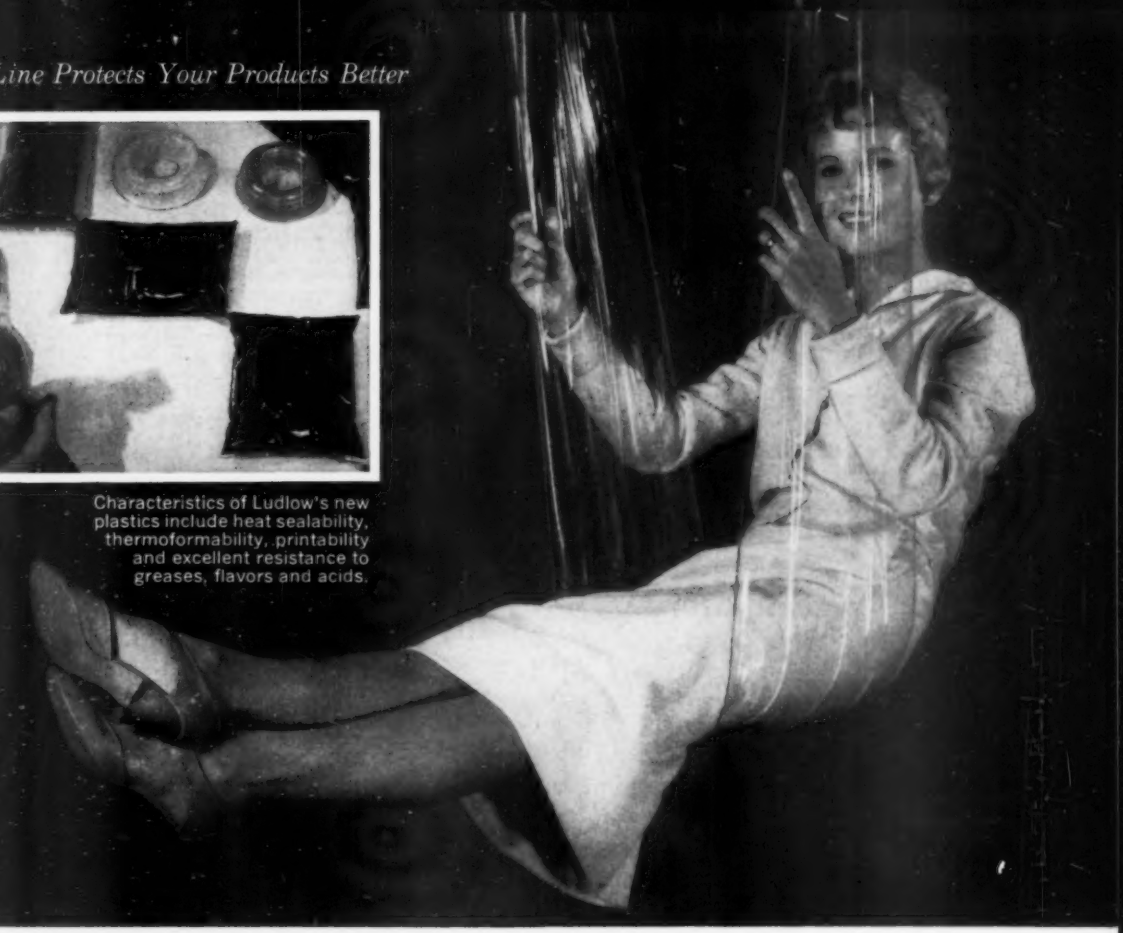

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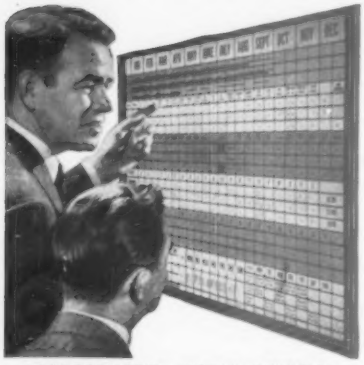

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Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

378—Helical Gears. Free copy of Gear Catalog 57 describes complete line and sizes. Horsburgh & Scott Co.

379—Record Systems. Information and literature on visible files for control. Acme Visible Records.

380—Marking Devices. Full data on specific marking crayon for plant and shipping needs. American Crayon Co.

381—Filters. Technical literature available on line of filters for industrial fluids. Commercial Filters Corp.

382—Roller Chains, Sprockets. New 154-page Catalog 2657 gives complete roller chain data. Link-Belt Co.

383—Hydraulic Press Brakes. Catalog 2024A gives details—capacities to 2000 tons. Cleveland Crane & Engrg. Co.

384—Processing Equipment. Catalog A-659 fully describes modern straight-line finishing system. R. C. Mahon Co.

385—Industrial Power Tools. Catalog describes line of power tools. Rockwell Mfg. Co., Delta Power Tool Div.

386—Embossed Labels. Illustrated brochure fully describes metal and plastic tape labels. Dymo Corp.

387—Marking Devices. Complete data on inspectors' marking hammers. Many styles and sizes. Pannier Corp.

MATERIALS HANDLING

388—Lift Truck. Brochure No. 5112 gives features of versatile stand-up electric truck. Yale & Towne Mfg. Co.

389—Padded Shipping Bags. Case histories tell how and why to use them in leading industries. Jiffy Mfg. Co.

390—Hoists. Catalog lists line: capacities from ⅛ to 2 tons; speeds, 8 to 60 fpm. Chisholm-Moore Hoist Div.

391—Lift Truck. Bulletin BH-82 has data on new 2000-lb. lift truck. Allis-Chalmers, Engine-Material Handling Div.

392—Tractors. Booklet, "How to Cut Costs for Grounds Maintenance," shows applications. Gravely Tractors, Inc.

393—Tramrail Cranes. Free Engineering and Application Booklet 2008. Cleveland Tramrail Div., Cleveland Crane.

394—Paper Bags. Free: Booklet CP-1 illustrates dozens of different ways to save costs. Union Bag-Camp Paper Corp.

395—Palletainers. Complete information on new junior collapsible containers. Union Steel Products Co.

396—Hydraulic Crane. Full data available on new all-purpose hydraulic crane. Austin-Western Div., B.L.H.

397—Sling Chains. New handbook contains complete details on all sling chain equipment. Campbell Chain Co.

MISCELLANEOUS

398—Coil-Car Covers. Complete shipping-protection facts on gondola car covers. Republic Steel Corp.

399—Metal Lumber. Idea-packed catalog gives facts on metal storage angle framing. Republic Steel Corp.

400—Steel Lockers. Information on line of steel lockers. Structural features detailed. Republic Steel Corp.

401—Washfountains. Catalog 5601 lists complete line—models and sizes for varied use. Bradley Washfountain Co.

402—Data Processing. Illustrated Brochure F-2 describes automatic punched-card control. Royal McBee Corp.

403—Pipe Tools. Free catalog shows complete line of hand and power pipe tools. Toledo Pipe Threading Co.

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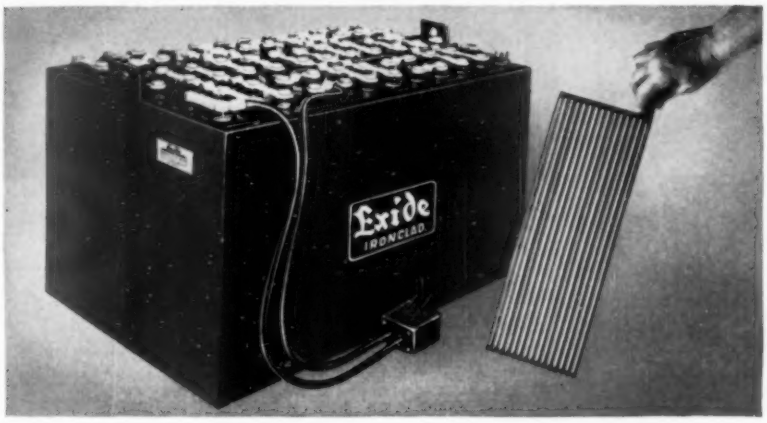

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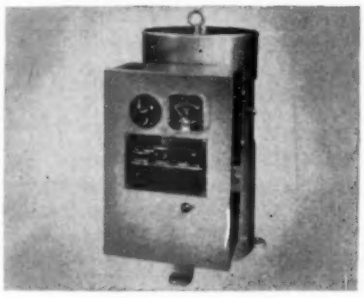

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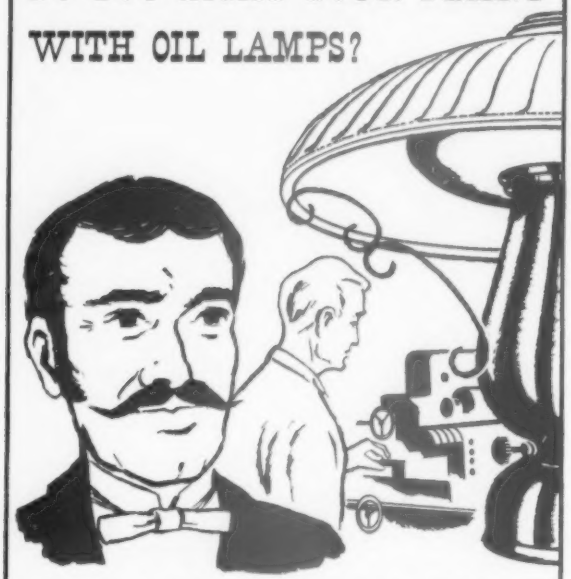

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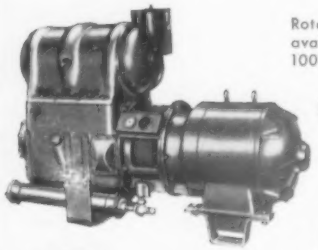

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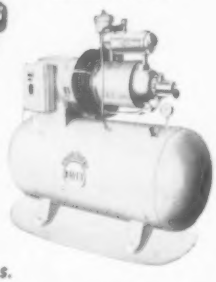

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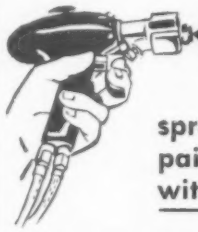

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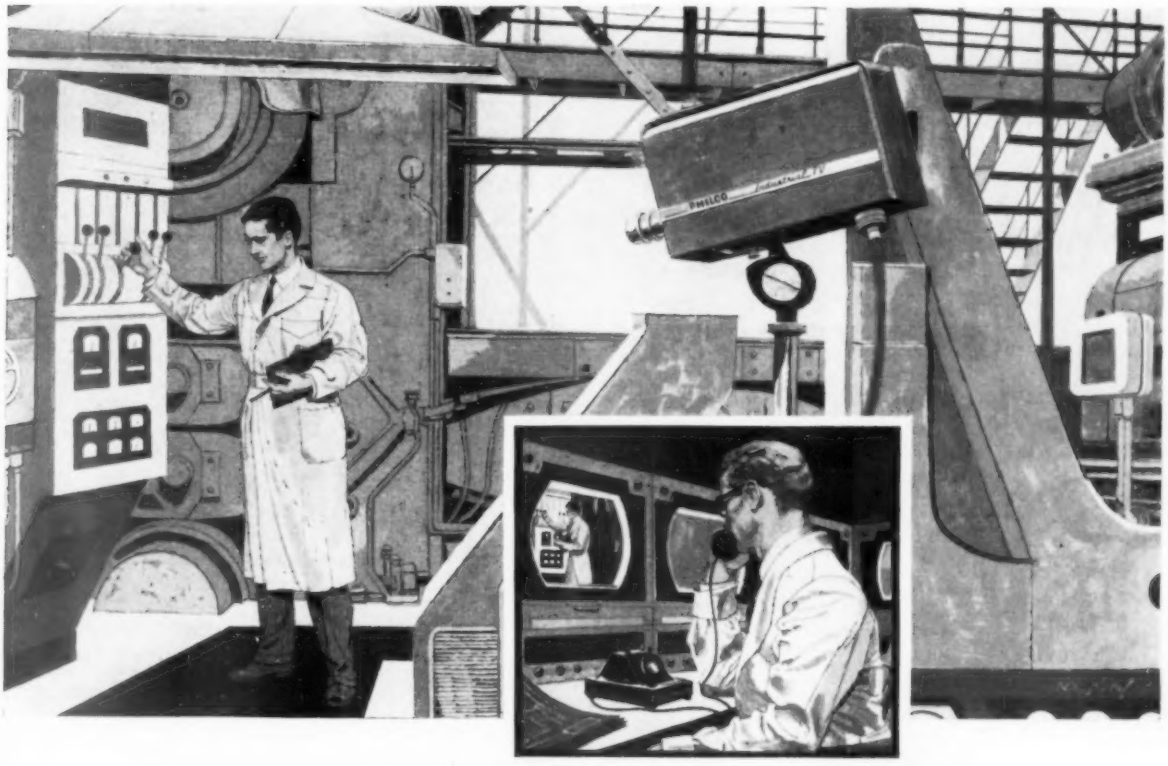

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A23 Maintenance Control Principles
A24 Keep Your Plant Up—Costs Down
A25 How to Build a Maintenance Program
A26 Maintenance Control That Really Controls
A27 Boost Maintenance Department's Productivity
A28 What Should Maintenance Cost?
A29 Find and Control Maintenance Costs
A30 Maintenance Work Measurement
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A180 Maintenance Stores Operations

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Index To Advertisements

Acme Industries, Inc. 217
Acme Steel Company
Acme Steel Products Div. 149, 180
Acme Visible Records, Inc. 129
Aeroquip Corporation 183
Alan Wood Steel Company 187
Alemite Div.,
Stewart-Warner Corp. 161
Allegheny Ludlum
Steel Corporation 256
Allen-Bradley Company 103, 104
Allis-Chalmers Mfg. Co. 155, 156, 157, 158
Engine-Material Handling Div. 141
American Crayon Company 110
American District Telegraph Co. 127
American Monorail 95
American Optical Company 107
Arro Expansion Bolt Co. 164
Austin-Western Construction
Equipment Div.,
Baldwin-Lima-Hamilton 118
Automatic Transportation
Company 219

Ballymore Company 194
Barreled Sunlight Paint Co. 132, 133
Bassick Company 143
Bausch & Lomb Optical Co. 225
Bearings Inc. 119
Bell & Gossett Company 13
Binks Manufacturing Co. 162
Black & Decker Mfg. Co. 151
Blaw-Knox Company 221
Boston Gear Works 153
Bradley Washfountain Co. 177
Buffalo Forge Company 198, 199
Bulldog Electric Products Co. 115
Bussmann Mfg. Div.,
McGraw-Edison Co. 26, 27
Byers Company, A. M. 169

Campbell Chain Company 108
Cascade Manufacturing Co. 39
Chisholm-Moore Hoist Division
Columbus McKinnon Chain Corp. 112
Clarage Fan Company 18
Clark Equipment Co. 17
Cleveland Crane & Engineering Co.
Steelweld Division 31
Cleveland Tramrail Division
Cleveland Crane &
Engineering Co. 30
Colorado Fuel & Iron Corp.
Wickwire Spencer Steel Div. 204
Commercial Filters Corporation 173

Davey Compressor Co. 246
Day-Brite Lighting Inc. 16
Dayton Rubber Company 229
Dazzo Products, Inc. 246
Delta Power Tool Division
Rockwell Mfg. Co. 206
Despatch Oven Company 201
Detrex Chemical Industries, Inc. 114
DeVilbiss Company 20, 21
Dodge Mfg. Corporation 98, 99
Douglas Fir Plywood Association .. 105
Dow Corning Corp. 29
Dymo Corp. 234

Eagle Manufacturing Co. 175
Electric Controller & Mfg. Co.
Division of Square D Company .. 111
Elwell-Parker Electric Co. 4
Exide Industrial Division,
Electric Storage Battery Co. 245

Factory 248, 252
Faultless Caster Corp. 126
Federal Pacific Electric Company 227
Felters Company 144, 145
Finnell System, Inc. 190
Furnas Electric Company 160

General Electric Co.
Lamp Department 189
Globe Company 152
Goodall Rubber Co. 102
Goodrich Company, B. F. 1
Goodyear Tire
& Rubber Co., Inc 5
Graphic Systems 244
Gravely Tractors Inc. 231
Grinnell Company .....Second Cover

Hagan Chemicals & Controls Inc. .. 202
Hannay & Son, Inc., C. B. 174
Hein-Werner Corporation 231
Homestead Valve
Manufacturing Co. 163
Horsburgh & Scott Co. 116

Ingersoll-Rand 223
Inland Steel Company 101
International Heating & Air
Conditioning Exposition 110

Jiffy Manufacturing Co. 231
Johnson Service Company 22, 23
Jordan Corporation 196
Joy Manufacturing Co. 11

Kidde & Company, Inc., Walter 136
Kinnear Mfg. Co. 8
Kollmann Manufacturing Co. 235

Lawson Company, F. H. 249
Link-Belt Company 19, 97
Logan Company 176
Ludlow Papers, Inc. 243
Lunkenheimer Co. 147
Lyon Metal Products Co. 203

Mac's Super Gloss Company, Inc. .. 230
Mahon Company, R. C. 28
Markem Machine Co. 15
McGraw-Hill Book Company 242
McQuay Inc. 237
Micro Switch, Division of
Honeywell 251
Mine Safety Appliances Company .. 117
Motorola Communications &
Electronics Inc. 168
Multi-Clean Products Inc. 139

Nordson Corporation 246

Otis Elevator Company 6, 7

Pangborn Corporation 207
Pannier Corporation 249
Pantex Manufacturing Corp. 236
Permacel-LePage's Inc. 223
Philco, Government &
Industrial Div. 247
Pittsburgh Corning Corp. 171
Pittsburgh Plate Glass Company 197
Polyken Sales Division,
The Kendall Company 191
Puritan Chemical Company 91
Purolator Products, Inc. 253

Radio Corporation of America 106
Ramset Fastening System 170
Remington Rand, Division of
Sperry Rand Corp. 239
Republic Steel Corporation 210, 211
Reznor Manufacturing Co. 235
Ridge Tool Company 130, 131
Roebling's Sons Corp., John A. 241
Royal McBee Corporation 224
Ryerson & Son, Inc., Joseph T. 34

Scott Paper Company 185
Sel-Rex Corporation 234
Service Recorder Company 196
Shuford Mills Inc. 10
Simplex Wire & Cable Company 135
SKF Industries Industries, Inc. 40
Skil Corporation 125
Sly Manufacturing Co., W. W. 218
Snap-On Tools Corporation 14
Southworth Machine Co. 228
Spencer Turbine Company 154
Square D Company .....Third Cover
Standard Dry Wall Products, Inc. .. 184
Standard Oil Company 113
Standard Pressed Steel Co. 178, 179
Steiner Company 159
Stic-Klip Manufacturing Co., Inc. .. 235
Structoglas Division, International
Molded Plastics Inc. 172
Sugar Beet Products Co. 140
Sun Oil Company 93

Technical Writing Service 250
Tennant Company, G. H. 186
Texas Company 128
Thiokol Chemical Corp. 195
Thomson-National Press
Company, Inc. 226
Timken Roller Bearing
Company .....Fourth Cover
Toledo Pipe Threading
Machine Co. 165
Tomkins-Johnson Co. 120
Torit Manufacturing Co. 142
Towmotor Corporation 9
Trane Company 24, 25
Tranter Mfg. Co. 137, 138
Typhoon Air Conditioning Co. 32, 33

Uhrden Inc. 249
Union Bag-Camp Paper
Corporation 12
Union Steel Products Co. 100
U.S. Rubber Company 109

Valdura Paint Division
American-Marietta Company 150

Weber Addressing Machine Co. 188
Westinghouse Electric
Corporation 87, 166, 167
Wooster Brush Company 205

Yale & Towne Manufacturing Co. .. 181

■

Industrial Consultants **246**

■

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■

Employment Opportunities **254**

Special Services **254**

EQUIPMENT
(Used or Surplus New) For Sale .. **254**

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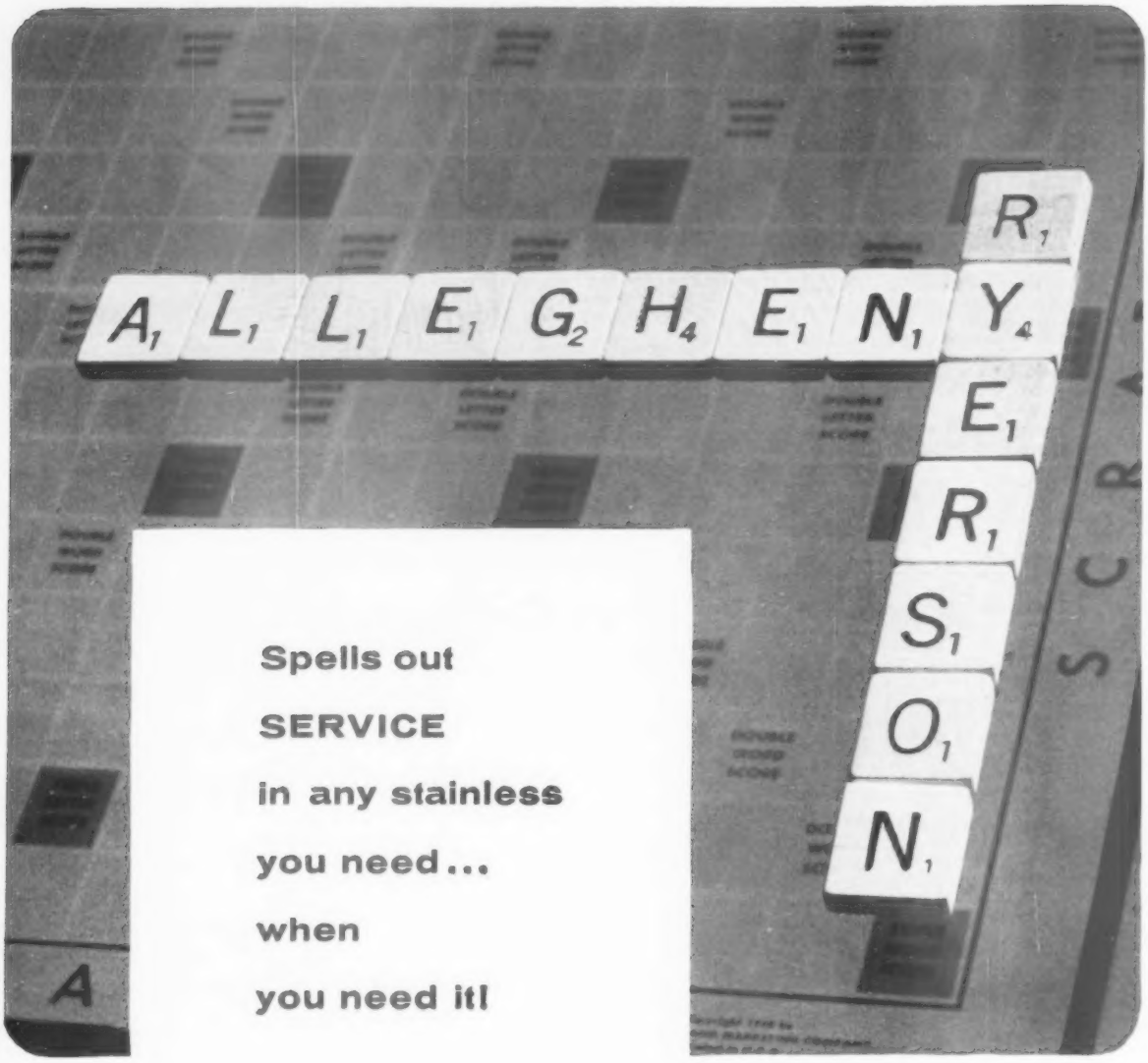

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WSW-7126

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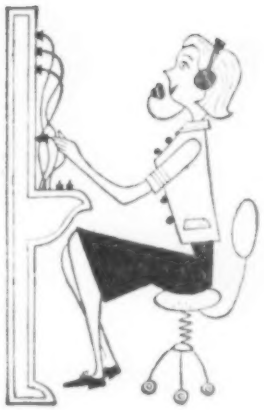

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FREE EDITORIAL FILE COPIES — FC-16 FC-17 FC-18 FC-19 FC-20 FC-21 FC-22 FC-23 FC-24

CATALOGS — 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86
87 88 89 90 91 92 93 94 95 96 97 98 99 100

EQUIPMENT — 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119
120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141
142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163
164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185
186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207
208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229
230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250

MATERIALS — 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269
270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290

IDEAS OF THE MONTH — 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307
308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329
330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345

ADVERTISERS' LITERATURE — 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361
362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383
384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405
406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427
428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445

ADVERTISEMENTS — 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463
464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485
486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507
508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529
530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551
552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573
574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595
596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617
618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639
640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661
662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683
684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705
706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727
728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749
750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771
772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793

JANUARY 1959 —2

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FREE EDITORIAL FILE COPIES — FC-16 FC-17 FC-18 FC-19 FC-20 FC-21 FC-22 FC-23 FC-24

CATALOGS — 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86
87 88 89 90 91 92 93 94 95 96 97 98 99 100

EQUIPMENT — 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119
120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141
142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163
164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185
186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207
208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229
230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250

MATERIALS — 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269
270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290

IDEAS OF THE MONTH — 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307
308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329
330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345

ADVERTISERS' LITERATURE — 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361
362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383
384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405
406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427
428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445

ADVERTISEMENTS — 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463
464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485
486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507
508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529
530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551
552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573
574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595
596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617
618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639
640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661
662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683
684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705
706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727
728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749
750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771
772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793

JANUARY 1959 —1

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Catalogs in This Issue

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BUILDING AND EQUIPMENT

1—Cable, Piping Supports
2—Metal Lath, Gratings, Decks
3—Foamglas Insulation
4—Floor Tile
5—Heating Coils
6—Fans
7—Air Distributing Units
8—Structural Systems
9—Steel Buildings
10—Centrifugal Pumps

MECHANICAL

11—Vari-Speed Motodrive
12—Gear Couplings
13—Instrument Bearings
14—Speed Reducers
15—Power Transmission Equipment
16—Gears

MAINTENANCE

17—Angle Vises
18—Radial Saws
19—Portable Heaters
20—Brushes
21—Rotary Compressor
22—Electric Cleaners
23—Battery Chargers

ELECTRICAL

24—Distribution Centers
25—Adjustable Speed Drives
26—Reduced Voltage Starters
27—Gear Drives
28—Electrical Equipment
29—Fusible Panelboards
30—Switches
31—Control Cables
32—Plastic Conduit

MATERIALS HANDLING

33—Transporter
34—Reactor Crane Control
35—Materials Handling Equipment
36—Overhead Cable Conveyors
37—Magnetic Crane Controls
38—Storage Racks
39—Keg, Carton Handling
40—Stacking and Loading
41—Conveying Systems
42—In-Plant Trackwork

PIPES AND VALVES

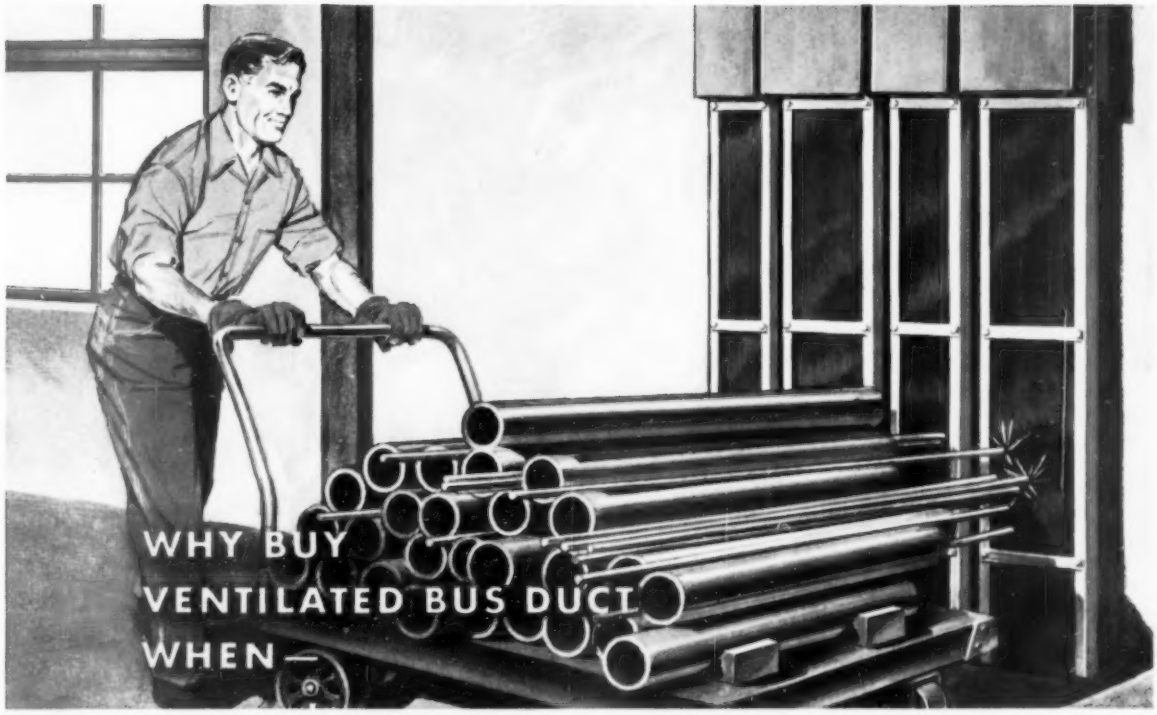
43—Pipe Fittings
44—Connectors
45—Hose, Tube Assemblies

PRODUCTION

46—Flow Transducer
47—Process Stream Analyzers
48—Hydraulic Weighing Systems
49—Flowmeters
50—Auto-Torque Driver
51—Turret Lathes
52—Turret Drills
53—Vibrator
54—Motor-Driven Timers
55—Work Holding Fixtures
56—Packaging Machinery
57—Wire Stitching
58—Welding Equipment

MISCELLANEOUS

59—Instruments and Apparatus
60—Heaters and Ventilators
61—Work Simplification
62—Radiant Heaters
63—Wipers
64—Production Record
65—Bin Card Holder



Square D TOTALLY ENCLOSED Duct* is SAFER—*and costs no more*

*(low impedance)

• Ventilated bus duct may be as vulnerable as it looks. In fact, Paragraph 3644 of the National Electrical Code prohibits its use in certain areas by specifying:

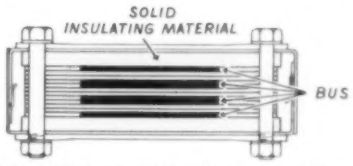
> **"Busways may extend vertically through dry floors if totally enclosed (unventilated) where passing through and for a minimum distance of six feet above the floor to provide adequate protection from mechanical injury."**

All Square D low-impedance duct is totally enclosed! It has no ventilation holes open to falling objects or dust. It's smaller than ordinary ventilated bus duct. It mounts in any position without de-rating. Doesn't it make sense, when buying low-impedance duct, to specify a product that's safer? Square D totally enclosed low-impedance duct costs no more—why settle for less!

Here's Why Square D's

EXCLUSIVE Design

makes ventilation unnecessary



The entire space within the duct and between the bus bars is filled with a solid insulating material which conducts the heat to the surface. There are no dead air spaces inside the duct. Square D totally enclosed low-impedance duct is listed with Underwriters' Laboratories and meets U/L requirements for temperature rise in any mounting position.

EC&M HEAVY INDUSTRY ELECTRICAL EQUIPMENT... NOW A PART OF THE SQUARE D LINE

SQUARE D COMPANY

For more facts circle 447 on READER SERVICE CARD

Name your bearing needs...we'll meet 'em pronto from 30 types, 10,247 sizes

TIME and time again, machinery makers come to the Timken Company for help with some special bearing application problem. One they think hasn't been solved before. And time after time, from our 30 types and 10,247 sizes of Timken® tapered roller bearings, we've come up with the bearing design to do the job and at minimum cost.

It's no accident that we can help out so often. In sixty years of helping machinery builders with bearing problems, we've engineered and produced the world's largest selection of tapered roller bearings. And we've constantly improved our designs. The answers to thousands of bearing application problems are already in our files. Ready and available to help you.

And machine users get the same swift service if they ever need a replacement Timken bearing. Even for old machines, they can almost always count on immediate delivery of Timken bearings for replacement.

Why not call on our engineers for help whenever you have a bearing application problem or requirement? Timken is your No. 1 bearing value. Wherever wheels and shafts turn, Timken bearings eliminate friction, cutting wear and maintenance to a minimum. Specify bearings trade-marked "Timken" for the machines you buy or build. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable: "TIMROSCO".

This symbol on a product means its bearings are the best.

TIMKEN TAPERED ROLLER BEARINGS ROLL THE LOAD

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